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Sequence
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FLORIDA TECHNOLOGICAL UNIVERSITY

COURSE DESCRIPTIONS

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COURSE DESCRIPTIONS

ACCOUNTANCY

ACCY 101 Basic Concepts (3)

Accounting and business procedures, introduction to recording of business transactions, recording and controlling cash, receivables, payables. Reliance of business on accounting.

ACCY 102 Basic Concepts (3)

PR: ACCY 101. Adjustment of operating data, financial statements, partnerships, corporations and other forms of business. Branch accounting.

ACCY 103 Basic Concepts (3)

PR: ACCY 102. Reading of financial statements, principles of valuation. The concept of cost. The budget concept.

ACCY 307 Accounting Concepts (5)

PR: Junior standing. An accelerated course in accounting concepts for the student desiring an understanding of accounting theory and practice. Credit may not be earned in both ACCY 307 and the ACCY 101, 102, 103 sequence.

ACCY 308 Accounting for Engineers (5)

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

ACCY 311 Intermediate Accounting (3)

PR: ACCY 103 or 307. Accounting theory and practice in relation to the management of business analysis and interpretation of financial statements and other accounting and financial data. Purpose of internal control of methods for its achievement.

ACCY 312 Intermediate Accounting (3)

PR: ACCY 311. Purchase and sale of assets. Consolidations, mergers, leases, and other forms of business cooperation. Analysis of depreciation methods. Standards in professional accounting.

ACCY 313 Advanced Accounting (3)

PR: ACCY 312 or consent of instructor. Complex cases in partnership formation, expansion and liquidation; installment and special sales arrangements; mathematics of compound interest and annuities.

ACCY 314 Advanced Accounting (3)

PR: ACCY 313 or consent of instructor. Cases of enterprises in distress, estates, trusts, and branches; basic principles and methods for parent and subsidiary relationships.

ACCY 321 Cost Accounting (3)

PR: ACCY 103 or 307. The elements of cost recording. The basic cost concept. The importance of cost determination and recording.

ACCY 322 Cost Accounting (3)

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

ACCY 331 Auditing (3)

PR: ACCY 313. The audit concept. Understanding evidence as applied to the audit. Fundamental techniques, practices and procedures.

ACCY 341 Government Accounting (3)

PR: ACCY 313. Budget, accounting and reporting problems of state and national governments. Design and installation of appropriate accounting systems. Improvement of methods and procedures for public bodies.

ACCY 351 Federal Income Tax Accounting (3)

PR: ACCY 313. History, theory and basic concept of federal income taxation principles.

ACCY 352 Federal Income Tax Accounting (3)

PR: ACCY 351. Corporation tax returns. Study of accounting methods acceptable for tax purposes. Study of federal income tax procedures and appeals methods.

ACCY 434 Audit Report Writing (3)

PR: ACCY 331. Preparation of audit reports. Legal and professional responsibilities of the auditor. Specialized reports and analyses. Professional ethics.

ACCY 461 Computer Applications to Accounting Problems (3)

PR: ACCY 313. 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 491 Problem Analysis (3)

PR: ACCY 331, 341, 351, and 361. Advanced C.P.A. problems for accounting majors. Problems in several forms of organization. Advanced statement preparation and analysis.

ACCY 499 Undergraduate Research (2-5)

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

ALLIED HEALTH SCIENCES

AHS 100 Allied Health Sciences Orientation (1)

A survey of the allied health sciences; opportunities and scope of the field.

ART

ART 201,202,203 Design (3,3,3)

Design fundamentals. Materials, processes, form. Application to product design, communication design, interior design, environmental design, and the fine arts. Stresses the value of planning and design in the development of a more humane civilization. Guest lecturers may be invited.

ART 204,205,206 Drawing (3,3,3)

Drawing as a means of formal organization. Introduction to problems in drawing techniques and media.

ART 207 20th Century Art (3)

ART 208 Ancient and Medieval Art (3)

ART 209 Renaissance, Baroque, and 19th Century Art (3)

ART 210 Oriental Art (3)

ART 301 Art History Seminar (2-5)

PR: Permission of instructor. Special topics in art history. Course of study and credits must be assigned prior to registration.

ART 302,303 Design Seminar (3,3)

Recent developments in the visual field.

ART 304 Photography (3)

PR: Six quarter hours in design fundamentals or consent of instructor.

ART 305 Painting (3)

PR: Six quarter hours in design fundamentals and six quarter hours in drawing fundamentals or consent of instructor.

ART 306 Sculpture (3)

PR: Six quarter hours in design fundamentals and six quarter hours in drawing fundamentals or consent of instructor.

ART 307 Design II (3)

PR: Nine quarter hours in design fundamentals or consent of instructor.

ART 401 Studio Art (2-5)

PR: Consent of instructor. Directed independent study in either photography, sculpture, painting, or design. Course of study and credits must be assigned prior to registration.

ART 403 Jewelry Creation (2-5)

PR: Consent of instructor. Course of study and credits must be assigned prior to registration.

ART 495 Senior Studio and Exhibition (3)

PR: Senior standing and consent of the studio areas faculty.

ART 497 Undergraduate Seminar (2-5)

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

ART 498 Independent Study (2-5)

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

BIOLOGY

BIOL 100 General Biology I (3)

Basic principles emphasizing the unifying concepts of biology and their relationships to diversity in living organisms. This course is a prerequisite to all other courses in the biological sciences.

BIOL 101 General Biology I Laboratory (1)

Laboratory exercises illustrating basic principles in biology; taken concurrently with BIOL 100.

BIOL 105 General Biology II (3)

PR: BIOL 100. An integrated approach to the Botanical and Zoological Sciences; the effect of society on the environment and its biological implications; suitable, with BIOL 100, for meeting Environmental Studies Program requirements.

BIOL 106 General Biology II Laboratory (1)

Laboratory exercises illustrating basic principles significant in today's environment; taken concurrently with BIOL 105.

BIOL 330 Immunology and Serology (3)

PR: 11 hours in biological sciences. Infection and the immune reaction; properties of antigens, production of antibodies; agglutination and precipitin reactions; quantitative techniques and isohemoagglutination.

BIOL 350 Principles of Ecology (3)

PR: 12 hours in biological sciences. Basic ecological processes applicable to all areas of ecology.

BIOL 360 Genetics (4)

PR: BIOL 100. Basic principles of heredity as applied to plants and animals. Laboratory will emphasize work with *Drosophila*.

BIOL 420 Cytology (4)

PR: 11 hours in biological sciences and CHEM 123. Structure of vegetative and reproductive cells; cytoplasmic differentiation; mitosis, meiosis, chromosomal aberrations.

BIOL 430 Cell Physiology (3)

PR: 11 hours in biological sciences and CHEM 123. Basic physiological processes, cellular organization, exchange of materials, conversion of energy, irritability and contractibility.

BIOL 460 Principles of Adaptation (3)

PR: 11 hours in biological sciences. An outline of evolutionary principles, natural selection, and phylogeny; origin of variation and origin of species.

BIOL 470 History of Biology (2)

PR: Junior standing. People and events from Aristotelian times to the present; development of science of biology.

BIOL 491 Contemporary Biology (3)

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).

BIOL 496 Special Topics (2-5)

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

BIOL 497 Undergraduate Seminar (2-5)

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

BIOL 498 Independent Study (2-5)

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

BIOL 499 Undergraduate Research (2-5)

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

BOTANY**BOT 100 General Botany (3)**

PR: BIOL 100. Introduction to botany; structure, function, representative groups of the plant kingdom.

BOT 101 General Botany Laboratory (1)

Laboratory exercises illustrating basic principles in botany; taken concurrently with BOT 100.

BOT 270 Economic Botany (3)

A lecture course to develop a broad understanding of the various plant groups and the economic importance of their members to man.

BOT 320 Plant Anatomy (4)

PR: BOT 100. Development and structure of the root, stem, and leaf of vascular plants.

BOT 330 Plant Physiology (5)

PR: BOT 100 and junior standing. Chemical and physical activities of plants; absorption, transpiration, mineral nutrition, photosynthesis, and growth.

BOT 340 Phycology (4)

PR: BOT 100. A lecture-laboratory course to survey the diversity and classification of marine, terrestrial and freshwater algae.

BOT 341 Mycology (4)

PR: BOT 100. A lecture-laboratory course to cover the major groups of fungi, treating their morphology and classification and emphasizing those of especial importance to man.

BOT 342 Bryology (4)

PR: BOT 100. A lecture-laboratory survey course on the diversity and

classification of mosses, liverworts and hornworts with special emphasis on those found in Florida.

BOT 345 Plant Taxonomy (4)

PR: BOT 100. Morphology and systematics of angiosperms; an introduction to flowering plant taxonomy.

BOT 350 Plant Ecology (4)

PR: BOT 345 or consent of instructor. Effects of environmental factors on various plant groups; succession and stabilization of plant communities.

BOT 430 Advanced Plant Physiology (4)

PR: BOT 330 and CHEM 352 or consent of instructor. Special problems in contemporary plant physiology; instrumentation methods.

BOT 445 Advanced Plant Taxonomy (4)

PR: BOT 345. Application of advanced biosystematic techniques and concepts to plant taxonomy; selected problems.

BOT 450 Advanced Plant Ecology (4)

PR: BOT 350. The application of ecological methods to local problems, emphasizing instrumental techniques and evaluation of data.

BOT 453 Plant Geography (3)

PR: BOT 345 and BOT 350. The major climax formations of the world and their representative plant taxa; the distribution of plants in time.

BOT 470 Plant Pathology (4)

PR: BOT 341 and MICR 200. A survey of the microorganisms causing plant diseases, emphasizing fungi, especially those forms which are important in Florida.

BOT 472 Botanical History and Nomenclature (3)

PR: BOT 345. The historical background of contemporary botany beginning in pre-Linnaean times and continued to the present, including the development of the International Code of Botanical Nomenclature and its application to special problems.

BOT 496 Special Topics (2-5)

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

BOT 497 Undergraduate Seminar (2-5)

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

BOT 498 Independent Study (2-5)

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

BOT 499 Undergraduate Research (2-5)

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

BUSINESS ADMINISTRATION**BADM 101 Business (4)**

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

BADM 301 Business Concepts (3)

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

BADM 311,312 Mathematical Applications to Business (3,3)

PR: MATH 115 or 121. A study of a wide range of quantitative decision procedures as applied to problems in business administration.

BADM 371 Business Law (3)

PR: Junior standing. Introduction to the law and the use of the case method. The law of business contracts.

BADM 372 Business Law (3)

PR: BADM 371. The uniform commercial code. Law of sales, law relating to negotiable instruments, the law of banks and banking.

BADM 373 Business Law (3)

PR: BADM 372. Law of agency, partnerships, and corporations.

BADM 444 International Business Operation (3)

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

BADM 474 Business Law, Interests in Property (3)

PR: BADM 373 or consent of instructor. Secured transactions, principles

*May not be offered before 1971.

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of property, personal and real, the law of bankruptcy, the law of suretyship.

BADM 484 Operations Research (3)

PR: ECON 321. Methods and models of operations research applied to specific business problems. Develops use of mathematical techniques and demonstrates its use in modern decision theory.

BADM 490 Senior Seminar: Business in Human Affairs (2)

Business issues and problems as they relate to human affairs. This course, primarily intended for the senior student, is offered as one of the Advanced Environmental Studies seminars. Not open to the student majoring in the College of Business Administration.

BADM 495 Business Policies (5)

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

BADM 695 Business Research Methods (3)

PR: Graduate standing. Identification of areas for research, methods of business and economic research, and presentation and evaluation of the results.

CHEMISTRY

CHEM 100 Freshman Orientation (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 (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 (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 (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 (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 (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 (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 (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 (3,3)

PR: CHEM 163 or CHEM 263, and CHEM 123; or CHEM 113. A lecture-laboratory course designed to establish a working knowledge of analytical laboratory techniques. A wide variety of classical and instrumental methods will be examined for their potential use in solving problems requiring chemical analysis. Emphasis will be placed on selecting the correct analytical method, performing the analysis, and interpreting the data obtained.

CHEM 355 Chemical Instrumentation for the Medical Laboratory (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 (3,3)

PR: CHEM 263. Continuation of CHEM 261, 262, 263.

CHEM 364,365 Physical Chemistry Measurements (2,2)

PR: CHEM 262 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 (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 (1)

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

CHEM 421,422 Advanced Organic Chemistry (3,3)

PR: CHEM 123, and CHEM 362 or CHEM 369. A consideration of organic reaction mechanisms in the light of bonding theories, thermodynamics, and kinetics.

CHEM 431 Inorganic Chemistry (3)

PR: CHEM 362 or CHEM 369. A discussion of descriptive inorganic chemistry based on various bonding theories, thermodynamics, and kinetics.

CHEM 441,442,443 Biochemistry (3,3,3)

PR: CHEM 123, and CHEM 362 or CHEM 369. 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 (2,2)

PR: CHEM 113 or CHEM 441, and CHEM 352. A laboratory course stressing the application of the chemical arts to the separation, identification, and quantitation of materials of biological significance.

CHEM 451,452 Analytical Laboratory Techniques (3,3)

PR: CHEM 352, and CHEM 362 or CHEM 369. A lecture-laboratory course designed to establish a thorough understanding of modern methods of chemical analysis. The purpose of this precise study will be to prepare the student to propose methods of analysis for any material he may encounter. Qualitative and quantitative organic analysis as well as specific instrumental techniques will be covered.

CHEM 461 Selected Topics in Physical Chemistry (3)

PR: MATH 321, and CHEM 362 or CHEM 369. A rigorous mathematical treatment of chemical thermodynamics, kinetics, and quantum mechanics.

CHEM 471 Introduction to Nuclear Chemistry (3)

PR: CHEM 362 or CHEM 369. Discussion of fundamental particles, nuclear reactions, radioactivity, radiation chemistry, and isotope chemistry.

CHEM 474 Radiochemical Techniques (2)

PR: CHEM 112 or CHEM 163 or CHEM 263, and CHEM 115 or CHEM 124. A lecture-laboratory course stressing radiochemical handling techniques, radiation safety, and the detection and measurement of nuclear radiation.

CHEM 491 Contemporary Chemistry (3)

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).

CHEM 496 Special Topics (2-5)

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

CHEM 497 Undergraduate Seminar (2-5)

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

CHEM 498 Independent Study (2-5)

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

CHEM 499 Undergraduate Research (2-5)

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

CIVIL ENGINEERING & ENVIRONMENTAL SCIENCES

CEES 221 Surveying (3)

CR: MATH 221. Theory and field practice in engineering, geological and land surveys. Two lectures, three hours laboratory.

CEES 321 Engineering Geology (3)

PR: 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.

CEES 351 Structural Mechanics (4)

PR: ENGR 312. Determinate and indeterminate analysis of structural elements, influence diagrams and effects of moving loads.

CEES 361 Transportation Engineering (3)

PR: 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.

CEES 371 Urban Planning (3)

PR: ENGR 342 and 371. History and principles of planning; contemporary urban problems; current urban planning techniques.

CEES 411 Environmental Engineering (3)

PR: ENGR 361. Man's environment, water resources, hydrologic cycle, chemistry of natural water, quality requirements and water treatment, water distribution systems.

CEES 412 Environmental Engineering (3)

PR: ENGR 361. Man's environment, the carbon cycle and biochemistry of wastes, principles of waste treatment, drainage systems.

CEES 414 Sanitary Systems Design (3)

PR: CEES 411 or 412 and CEES 481. Planning capacity, and design of water distribution and domestic and storm drainage systems.

CEES 415 Atmospheric Pollution (3)

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 (4)

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 (4)

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 (3)

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 (3)

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

CEES 441 Computer Applications in Structural Analysis (3)

PR: COMP 102, CEES 351, or MEAS 424. The use of digital computers in solving structural analysis problems. Matrix methods, finite element, structural techniques, and vibration and buckling analysis using the digital computer. Case studies.

CEES 443 Continuum Mechanics (3)

PR: ENGR 312; CR: ENGR 472. Cartesian tensors. Stress and deformation in a continuum. Physical laws – Eulerian form; applications to solids and fluids.

CEES 451 Structural Design (3)

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

CEES 461 Transportation Engineering (3)

PR: CEES 361. Advanced topics in transportation system analysis.

CEES 462. Traffic Engineering (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 (3)

PR: CEES 371. Municipal organization and administration, public health, public utilities, services, zoning, replanning, critical studies.

CEES 481,482 Water Resources Engineering (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 (2-5)

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

CEES 497 Undergraduate Seminar (2-5)

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

CEES 498 Independent Study (2-5)

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

CEES 499 Undergraduate Research (2-5)

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

COMMUNICATIONS

COM 100 Basic Communications (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 103 Voice and Diction (3)

Basic principles of diction, voice, development, and interpretation; intensive practical application through classroom exercises and special projects designed to meet individual vocal needs and professional objectives.

COM 300 Communication Theory as Related to the Mass Media (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 310 History of the Motion Picture (3)

Development of the film industry, its social and economic impact.

COM 311 Business and Professional Communication (3)

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

COM 400 Opinion and the Mass Media (3)

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 (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 (3)

Relationships between the mass media and society; examination of social and ethical responsibilities of the media.

COM 411 Legal Responsibilities of the Mass Media (3)

Legal rights and restrictions, including Constitutional guarantees; libel, invasion of privacy, and contempt of court.

COM 496 Special Topics (2-5)

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

COM 497 Undergraduate Seminar (2-5)

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

COM 498 Independent Study (2-5)

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

COM 499 Undergraduate Research (2-5)

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

COMPUTER SCIENCE

COMP 101 Introduction to Computer Science (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.

ECONOMICS

COMP 102 Computer Programming (3)

CR: MATH 221. Digital computer programming and its application to the numerical solution of elementary engineering and scientific problems.

COMP 201,202,203 Algorithms and Programming (3,3,3)

PR: COMP 101 or COMP 102. Problem definition and solutions; notion of an algorithm; algorithmic representations; an introduction to (1) machine-oriented languages, (2) scientific programming languages, and (3) business-oriented languages; definition and use of functions, subroutines, and procedures; applications. During the third quarter of this sequence, the student will be assigned a major problem for analysis and solution.

COMP 301,302,303 Data Structures (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 401 System Design (3)

PR: COMP 302. Processor characteristics; peripheral equipment characteristics; information representation; zero-, single-, and multi-address processing, memory utilization; batch processing; paging and overlay; addressing schemes; control functions; input and output characteristics; and an introduction to data communications.

COMP 411 Operating Systems (3)

PR: COMP 401. Task scheduling; file management; file security; multi-programming; communication between system components, system logs and accounting; and status reporting.

COMP 421 Compiler Structure (3)

PR: COMP 401. A review of the major problem-oriented languages; syntax analysis; bootstrapping techniques and meta-compilers; 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 (3,3,3)

PR: COMP 202, MATH 317 or MATH 318, and MATH 321; or consent of instructor. 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 (3,3,3)

PR: COMP 202, MATH 317 or MATH 318, and MATH 321; or consent of instructor. Linear, nonlinear, and dynamic programming; linear inequalities; theory and application of methods for determining the maximum and minimum of functions of many variables subject to constraints; special techniques for solving integer programming problems; simplex method and variants; gradient methods; applications in business, science and engineering.

COMP 481,482,483 Computer Processing of Statistical Data (3,3,3)

PR: MATH 321, STAT 402, and COMP 101 or COMP 102; or consent of instructor. The use of high-speed electronic computers in statistical analysis; approximation methods; error analysis; Monte Carlo calculations; simulation; combinatorial problems; matrix calculations; least squares analysis; multiple regression; stepwise regression; non-linear estimation; characteristic value problems; principal component analysis; factor analysis; analysis of variance and covariance computations.

COMP 487,488,489 Computer Processing of Business Data (3,3,3)

PR: Junior standing and COMP 101 or COMP 102. 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; sequential and random processing methods; exception reporting; on-line and off-line systems and controls; management games; advanced data systems and processing techniques.

COMP 496 Special Topics (2-5)

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

COMP 497 Undergraduate Seminar (2-5)

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

COMP 498 Independent Study (2-5)

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

COMP 499 Undergraduate Research (2-5)

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

ECON 201 Principles of Economics (3)

The nature and method of economics. National income measurement, determination, and stabilization, including an analysis of the money and banking system.

ECON 202 Principles of Economics (3)

PR: ECON 201. The functioning of the market system in the determination of product prices.

ECON 203 Principles of Economics (3)

PR: ECON 202. The functioning of the market system in the determination of factor prices. Consideration of the problems of agriculture, economic development, international trade, and labor.

ECON 301 Intermediate Price Theory (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 (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 (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 (4)

PR: ECON 203, MATH 115 and STAT 201. 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 STAT 321).

ECON 331 Economics of Labor (3)

PR: ECON 203. A survey of the growth, structure, objectives, and collective bargaining practices of organized labor groups.

ECON 341 International Economics (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 Economics of Agricultural Production, Pricing, and Policy (3)

PR: ECON 203. The application of economic analysis to the agricultural sector of the economy.

ECON 371 Mathematical Economics (3)

PR: ECON 203 and MATH 123. An introduction to the mathematical tools of modern economic analysis.

ECON 381 Economics of Public Utilities (3)

PR: ACCY 103 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 (3)

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

ECON 411 Comparative Economic Systems (3)

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 (5)

PR: ECON 321. Concepts and methods of developing, analyzing, and interpreting measures of economic activity and business and economic change.

ECON 431 Public Finance in the American Economy (3)

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 (3)

PR: ECON 431. The economics of government spending and taxation; analysis of the fiscal role and instruments of government and their effects on the economy. Fiscal policy, intergovernmental fiscal relationships, inflation, debt.

ECON 441 Economic Development (3)

PR: ECON 203. The processes and problems of economic development.

ECON 451 Econometrics (3)

PR: ECON 371 and ECON 421. Application of modern statistical methods to economic theory and problems.

*May not be offered before 1971.

ECON 461 Business and Government (3)

PR: ECON 203. A survey of the most significant public policies affecting business firms.

ECON 471 History of Economic Thought (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 (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 (2-5)

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

ECON 611 Economics of the Firm (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 621 Aggregate Economics – Income, Employment, and Growth (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.

BUSINESS EDUCATION - DEVELOPMENTAL**EDBE 101 Introductory Typewriting (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 (3)

PR: EDBE 101 or equivalent. Continuation of development of skills in

*May not be offered before 1971.

speed and accuracy and introduction to skill building procedures in communications production.

EDBE 103 Communications Production-II (3)

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

EDBE 201 Principles of Shorthand-I (3)

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

EDBE 202 Principles of Shorthand-II (3)

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

EDBE 203 Principles of Shorthand-III (3)

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

EDBE 301 Shorthand Dictation (3)

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

EDBE 302 Shorthand Transcription (3)

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

EDBE 305 Office Technology (3)

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

EDBE 405 Principles of Business - Vocational Education (3)

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

EDBE 406 Office Systems and Procedures (3)

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 (3)

PR: CI. A critical analysis of the business curricula in post secondary schools; development of philosophy, objectives, and design of innovative programs in business.

ELEMENTARY EDUCATION - DEVELOPMENTAL**EDEL 301 Teaching Mathematics in the Elementary School (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 (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 (3)

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

EDEL 307 Literature for Children (3)

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

EDEL 311 Basic Foundations of Reading (3)

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

EDEL 312 Reading in the Elementary School (3)

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

EDEL 315 Teaching Science in the Elementary School (3)

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

EDEL 316 Elementary School Curriculum (3)

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

EDEL 317 Teaching Social Science in the Elementary School (3)

PR: EDEL 315. Consideration of selected themes, problems, and concepts; organizing for instruction; techniques and activities; evaluation procedures.

EDEL 401 Programs in Early Childhood Education (3)

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

EDEL 402 Developmental Processes in Early Childhood (3)

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

EDEL 403 Language and Cognition of Young Children (3)

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

EDEL 404 Organization of Instruction in Nursery-Kindergarten Education (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 (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 (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 (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 (3)

PR: Admission to Phase II or consent of instructor. 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 (3)

PR: Admission to Phase II or consent of instructor. 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 (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 (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 (3-5,3-5)

Workshop for the improvement of the elementary school curriculum. Open to in-service teachers.

EDEL 630 Trends in Elementary School Reading Education (3)

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

PHYSICAL EDUCATION - DEVELOPMENTAL**EDPE 305 Rehabilitation Training Techniques (3)**

PR: Admission to Phase II or consent of instructor. Recognition and rehabilitation of sports injuries including first aid.

EDPE 306 Administration and Coaching (3)

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 (3)

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 (5)

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 (5)

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 Physical (3). See page 27.**EDPE 322 Exercise Physiology - Respiratory (5)**

PR: ZOOL 234. A study of metabolic costs and respiratory adjustment to exercise.

EDPE 324 Instructional Analysis in Tennis (2)

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

EDPE 325 Instructional Analysis in Aquatics (2)

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

EDPE 326 Instructional Analysis in Gymnastics and Tumbling (2)

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

EDPE 327 Instructional Analysis in Golf (2)

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

EDPE 328 Instructional Analysis in Wrestling (M) (2)

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

EDPE 329 Choreography of Contemporary Dance (W) (2)

Dance production as an art form.

EDPE 330 Rhythms, Notation, Meter and Form (2)

Elements common to music and movement.

EDPE 405 Organization and Administration of Secondary School Physical Education (3)

Nature and scope of secondary school physical education athletic, intramural and adaptive programs.

EDPE 406 Organization and Administration of Elementary School Physical Education (3)

Nature and scope of elementary school physical education athletic, intramural and adaptive programs.

EDPE 407 Family Living Concepts (5)

The ideas and principles of healthy family living.

EDPE 408 Contemporary Health Hazards (5)

The effects of drugs and other mood modifiers.

EDPE 601 Philosophical Foundations of Physical Education (3)

PR: Rank III Certificate or CI. Analysis of the forces and events leading to the development of current concepts in physical education.

NOTE: For physical education electives (ESPE) to satisfy the Environmental Studies Requirements, see page 12.

PROFESSIONAL LABORATORY - APPLICATION**EDPL 407 Student Teaching (3-12)**

PR: Admission to Phase II. Student teaching in a public elementary or secondary school under the supervision of a selected classroom teacher.

EDPL 408 Teaching Strategies (3)

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

EDPL 409 Teaching Strategies (4)

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

EDPL 458 Supervision of Professional Laboratory Experiences (3)

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 (1) Laboratory

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 465,466 Teaching Practicum (5,5)

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

SECONDARY EDUCATION - DEVELOPMENTAL**EDSE 303 School Programs (3)**

A study of the public school curriculum, Kindergarten through grade twelve.

EDSE 304 Instructional Techniques (3)

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

EDSE 305 Secondary School Curriculum (3)

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 (4)

PR: Admission to Phase II. Techniques, materials, and instructional media; psychological principles, evaluation, and current trends in type-writing instruction.

EDSE 307 English Instructional Analysis (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 (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 (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 (3)

PR: Admission to Phase II. Techniques, materials, and instructional media; psychological principles, evaluation, and current trends in short-hand and related instruction.

EDSE 406 Business Instructional Analysis-III (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 (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 (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 (4)

PR: Admission to Phase II. Study of instructional programs in Social Sciences; objectives; materials; techniques; organization of instruction; evaluation procedures; current research.

EDSE 415 Reading in the Secondary School (3)

PR: Admission to Phase II or consent of instructor. Developmental reading for the junior and senior high school pupil.

EDSE 475 Secondary School Curriculum (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 (2-5,2-5)

Workshop for improvement of the secondary school curriculum. Open to in-service teachers.

EDSE 478 Instructional Analysis in Business (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 (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 (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 (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 (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 (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 (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 (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 (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 (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 (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 601 Curriculum Planning (3)

PR: Rank III Certificate or CI. Identifying major concepts, writing objectives, listing activities and developing course layouts for a secondary school subject area.

TEACHING ANALYSIS

EDTA 206 Human Development (3)

Analysis of basic principles and applications in growth and learning from conception through adolescence. EDTA 307 recommended concurrently.

EDTA 305 Principles of Evaluation (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 (3)

PR: Admission to Phase II. Study of applications of learning theory to classroom teaching.

EDTA 307 Teaching Analysis (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 (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 (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 (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 (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 (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 (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 (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 (3)

PR: EDTA 603 or CI. Design rationale and construction, sampling methods, control and limits.

ELECTRICAL ENGINEERING & COMMUNICATIONS SCIENCES

EECS 311 Switching Theory (3)

PR: ENGR 321. Logical functions. Theory and application of Boolean algebra. The minimization of logical expression and networks including NAND and NOR logic.

EECS 321 Electrical Networks (3)

Continuation of ENGR 322.



EECS 322 Electronic Engineering (4)

Continuation of ENGR 323. Three lectures, three hours laboratory.

EECS 331 Electromechanics (3)

PR: ENGR 322. Energy conversion by electromechanical methods.

EECS 341 Electromagnetic Fields (3)

PR: ENGR 322. Introduction to fields and waves.

EECS 411 Logical Component Design (3)

PR: EECS 311. Theory of number systems and arithmetic. Sequential circuit theory. Design and application of serial and parallel logical components including counters, registers, adders and subtractors. Principles of stored program computers.

EECS 412 Logical Systems Design (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 (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 (3)

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

EECS 421 Electrical Networks (3)

PR: EECS 321 and 341. Traveling electromagnetic waves with application to distributed parameters. Two lectures, three hours laboratory.

EECS 431 Electrical Machinery (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 (4)

PR: EECS 341 and 421. Microwave devices and systems. Three lectures, three hours laboratory.

EECS 443 Coherent Optics Applications (3)

PR: EECS 341. Theory and design of coherent optical systems, lasers, information, processing, communications, holography.

EECS 451 Communication Theory (4)

PR: EECS 321 and 322. Information transmission, modulation, and noise. Three lectures, three hours laboratory.

EECS 453 Random Processes (3)

PR: MATH 321 and ENGR 321. Random variables, averaging, sampling, elements of probability theory.

EECS 461 Semiconductor Devices (3)

PR: EMS 411. Semiconductors with non-uniform impurity distribution; impurity diffusion, analysis of drift transistor with constant built-in field. Junction field-effect transistors. Two lectures, three hours laboratory.

EECS 462 Solid State Systems (3)

PR: EECS 461. Selection and use of device models in system analysis.

EECS 464 Solid State Electronics (3)

PR: EECS 461. Theory of solid state devices.

EECS 496 Special Topics (2-5)

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

EECS 497 Undergraduate Seminars (2-5)

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

EECS 498 Independent Study (2-5)

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

EECS 499 Undergraduate Research (2-5)

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

ENGINEERING CORE**ENGR 101 Engineering Graphics (3)**

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

ENGR 103 Creative Design (3)

PR: Approval of instructor. Role of the engineer as a creative design professional. Emphasis on understanding the creative process and factors

that influence it. Attitudes and viewpoints of the designer and an investigation of the techniques of analysis, synthesis, and evaluation used. Two lectures, two hours recitation-laboratory.

ENGR 111 Engineering Concepts (3)

PR: Approval of instructor. Lecture-demonstrations of the basic physical phenomena essential to the understanding of engineering structures, machines, processes, and systems. Primary emphasis on (1) mechanics and materials behavior, (2) electrical phenomena, (3) thermo-fluid mechanics phenomena. Two lectures, two hours laboratory-demonstration.

ENGR 151,152 Chemical Foundations of Engineering (3,3)

PR: Satisfactory performance in one year of high school chemistry and one year of high school physics or other natural science or CHEM 111; CR: Math 221. Atomic structure and bonding; properties of gases, solids, liquids, and solutions; chemical equilibrium, thermodynamics and kinetics; organic and inorganic reactions. Lecture, demonstration and recitation.

ENGR 201,202,203 Engineering Design Case Studies (1,1,1)

PR: Sophomore standing and ENGR 103. A discussion of the role of various engineering disciplines in the creative design process. Invited guest speakers will review pertinent case studies. Primary emphasis on (1) mechanical engineering-aerospace sciences projects, (2) civil engineering-environmental sciences projects, and (3) electrical engineering-communication sciences projects. Attention will be given to engineering administration, systems, and materials throughout. Two hours lecture discussion.

ENGR 211 Engineering Analysis—Statics (4)

CR: MATH 321. Force systems, resultants, equilibrium, distribution forces. First and second moments of areas and masses.

ENGR 221 Electrical Science (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 (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 (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 (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 (4)

PR: ENGR 321. Mathematical analysis of networks and linear systems. Lecture, demonstration, and laboratory.

ENGR 323 Electronic Engineering (4)

PR: ENGR 322. Electronic circuits. Lecture, demonstration, and laboratory.

ENGR 331 Thermodynamics (4)

PR: MATH 321 and ENGR 312. Work, heat and energy transformations. Relation of properties. Laws, concepts and modes of analysis common to all applications of thermodynamics in engineering.

ENGR 332 Fluid Mechanics (4)

PR: ENGR 331. Basic principles of continuum fluid mechanics and transport concepts. Lecture, demonstration, and laboratory.

ENGR 341 Engineering Economic Analysis (3)

PR: MATH 221. Economic evaluation of engineering alternatives.

ENGR 342 Systems Analysis (3)

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 (3)

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 (3)

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

ENGR 361 Man and His Environment (3)

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

ENGR 371 Probability and Statistics for Engineers (3)

PR: MATH 321. Axioms of probability; combinatorial and geometrical probability; probability distributions; measures of location and dispersion; sampling and sampling distributions; estimation and tests of hypotheses; engineering applications. (Same as STAT 335).

ENGR 431 Transport Processes (3)

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 (3)

PR: Junior standing. Composition for technical papers, reports and scientific articles suitable for publication. Oral and written presentation.

ENGR 442 Operations Research (3)

PR: ENGR 371. Mathematical methods of Operations Research; linear programming.

ENGR 443 Engineering Administration (3)

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 (3,3)

PR: MATH 321, MATH 331. The application of mathematical methods to engineering problems including vector and tensor fields, state space techniques, orthogonal curvilinear coordinates and orthogonal functions.

ENGR 473 Analytical Methods in Engineering (3)

PR: ENGR 471 or consent of instructor. The kinematics and dynamics of ideal field theory problems and their mathematical expression. Formulation of boundary conditions. Basic concepts of complex potential and conformal mapping with application to problems in fluid flow, thermal and electric potential.

ENGR 474 Analytical Methods in Engineering (3)

PR: ENGR 471 or consent of instructor. Engineering applications of partial differential equations and the concept of the mathematical modeling of physical problems. Development of characteristic properties of equations and methods of solutions including separation of variables, transform techniques and method of characteristics.

ENGR 475 Numerical Analysis in Engineering (3)

PR: MATH 321, MATH 331. Application of numerical techniques to the

solution of complex engineering problems. Analysis and organization of practical programs for numerical solution of initial, boundary and eigenvalue problems.

INTERDISCIPLINARY COURSES**ENGR 481 Man and Machine (3)**

The influence and inter-relationship of invention and technical progress on the evolution of social forms and institutions.

ENGR 482 Engineering & Technology in History (3)

Important developments in engineering and technology and their effect on society and our socio-economic processes and institutions.

ENGR 483 Technology and Social Change (3)

Review of existing theories of social change, analysis of the role of technology as related to social change, and study of contemporary events in technology and their possible impact on society.

ENGR 484 Science in History (3)

Examination of the reciprocal relations of science and society from ancient to recent times.

ENGR 485 Topics in Urban Development (3)

Production, distribution, and consumption of various commodities and engineering relationships to distribution, internal structure, and function of urban developments. Inter-relationship of engineering, social, economic, and cultural phenomena.

ENGR 486 Science, Engineering, and Ethical Systems (3)

A study of the contributions of science and engineering to society in light of moral, social, and ethical principles. A systematic and critical consideration of representative ethical problems created by advancing technology.

ENGR 487 Historical Architecture (3)

Architecture as the realization of changing aesthetic and cultural ideals and the expression of changing forms of society. Development of understanding of our physical environment through a study of the forms, functions and determinants of architecture.

ENGR 490 Engineering in Human Affairs (2)

The impact of engineering on modern society. This course, primarily intended for the senior student, is offered as one of the Advanced

Environmental Studies Seminars. Not open to students majoring in the College of Engineering.

ENGR 496 Special Topics (2-5)

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

ENGR 497 Undergraduate Seminar (2-5)

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

ENGR 498 Independent Study (2-5)

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

ENGR 499 Undergraduate Research (2-5)

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

ENGINEERING MATERIALS SCIENCES**EMS 411 Semiconductor Materials and Devices (3)**

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

EMS 412 Electronic Properties of Materials (3)

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

EMS 413 Thermodynamic Properties of Materials (3)

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

EMS 421 Theory of Crystalline Solids (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 (3)

PR: Senior standing. Basic properties and metallurgy of engineering materials including ferrous and non-ferrous metals and alloys; studies of cermets and plastics; production and processing of engineering materials. Two lectures, three hours laboratory.

EMS 432 Metallurgy (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 (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 (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 (3)

PR: ENGR 351. Engineering testing methods for materials in common use in construction applications. Properties of structural alloys, concrete, asphalt, plastics and interpretation of test results.

EMS 496 Special Topics (2-5)

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

EMS 497 Undergraduate Seminar (2-5)

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

EMS 498 Independent Study (2-5)

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

EMS 499 Undergraduate Research (2-5)

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

ENGLISH**ENG 101 Composition I (3)**

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

ENG 102 Composition II (3)

PR: ENG 101 or equivalent. Writing practice involving the mechanics of

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research and evaluation of varied readings. A documented paper will demonstrate the student's grasp of writing principles studied.

ENG 103 Current Literature (3)

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 210 Principles of Literature (3)

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

ENG 211 Survey of English Literature to 1625 (3)

ENG 212 Survey of English Literature, 1626-1798 (3)

ENG 213 Survey of English Literature, 1798-1914 (3)

ENG 300 Expository Writing (3)

Training in advanced composition, primarily intended for students in the College of Education. Theory and practice of the several forms and applications of expository writing.

ENG 301 Professional Report Writing (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 (3)

PR: Permission of instructor. Intensive practice in the essential tool-skills of writing, applicable to more advanced work in non-fiction, fiction, poetry, and drama.

ENG 303 Creative Writing Workshop II (3)

PR: ENG 302 or approval of instructor. Analytic study of the work of established writers; practice in producing short forms of fiction or non-fiction. (May be repeated once for credit.)

ENG 304 Creative Writing Workshop III (3)

PR: ENG 302 or approval of instructor. Analytic study of the work of established poets; practice in producing original verse in both traditional and modern forms.

ENG 311 Survey of American Literature, 1588-1865 (3)

ENG 312 Survey of American Literature, 1865-1914 (3)

ENG 313 Survey of American Literature Since 1914 (3)

ENG 314 Survey of British Literature Since 1914 (3)

ENG 316 Continental European Fiction Since 1900 (3)

A selection of significant works of fiction written in various languages during the present century, read in translation.

ENG 321 Exploring Poetry (3)

A broad, cultural approach to poetry, with emphasis upon the major themes and preoccupations of poets of all ages.

ENG 361 Practical Criticism (3)

Student evaluation of selected fiction, poetry, and drama through practical exercises in literary criticism.

ENG 371 Principles of Linguistics (3)

Basic linguistic concepts and an introduction to historical, descriptive, comparative, and applied linguistics. Recommended for students in Secondary Education as well as majors in English.

ENG 401 Senior Writing Workshop I (3)

PR: Evidence of writing skill satisfactory to the instructor. Analysis of significant non-fiction; market research; intensive writing practice leading to a completed body of non-fiction writing suitable for publication. Should be taken in conjunction with ENG 498. (May be repeated once for credit).

ENG 402 Senior Writing Workshop II (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 (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 (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 (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 (3)

Early prose, poetry, and drama (exclusive of Shakespeare).

ENG 422 Studies in 17th Century English Literature II (3)

Literature of the Puritan domination.

ENG 423 Studies in 17th Century English Literature III (3)

Literature of the Restoration period.

ENG 424 Studies in 18th Century English Literature I (3)

Selected works of writers of the first 40 years of the 18th Century.

ENG 425 Studies in 18th Century English Literature II (3)

The rise of the English novel and the "Age of Johnson."

ENG 426 Studies in 18th Century English Literature III (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 (3)

English Literature from 1798-1832: the Romantic Triumph in poetry and prose.

ENG 428 Studies in 19th Century English Literature II (3)

English Literature from 1832 to 1870: the early Victorians.

ENG 429 Studies in 19th Century English Literature III (3)

English Literature from 1870 to 1914: later Victorians and transitional writers.

ENG 430 Chaucer (3)

The Canterbury Tales, Troilus and Criseyde, and other works.

ENG 431 Shakespeare's Comedies (3)

ENG 432 Shakespeare's Histories (3)

ENG 433 Shakespeare's Tragedies (3)

ENG 434 Milton (3)

Paradise Lost, Paradise Regained, Samson Agonistes, shorter poems, and selected prose.

ENG 441 English Drama to 1642 (exclusive of Shakespeare) (3)

ENG 442 Restoration and 18th Century English Drama (3)

ENG 444 The British Novel in the 18th Century (3)

ENG 445 The British Novel in the 19th Century (3)

ENG 446 The American Novel in the 19th Century (3)

ENG 451 British and American Fiction Since 1900 (3)

ENG 452 British and American Poetry Since 1900 (3)

ENG 453 British and American Drama Since 1900 (3)

ENG 460 Historical Survey of Literary Criticism (3)

Study of the major critics from classical antiquity through the modern era.

ENG 461 British Literary Criticism to 1900 (3)

PR: ENG 460. Study of the major critics in England from the Renaissance through the Victorian period.

ENG 462 British Literary Criticism Since 1900 (3)

PR: ENG 460. Study of the important critical theories and principles developed in England from the Edwardian era to the present.

ENG 463 Literary Criticism in the United States (3)

PR: ENG 460. Study of American Literary critics to the present.

ENG 465 Literature for Adolescents (3)

Selecting and evaluating books for adolescents, with emphasis on the uses of books in the development of young people. Required for secondary school English teachers and students seeking certification in Library Sciences.

ENG 471 History of the English Language (3)

PR: Eng 371. Historical development in the morphology and phonology of the English language.

ENG 472 Modern English Grammar (3)

English etymology, parts of speech, inflection, syntax, and modern usage. Required for secondary school English teachers.

ENG 473 English Linguistics (3)

PR: ENG 371. The application of modern linguistic methods to the phonology, morphology, and syntax of present-day English.

ENG 496 Special Topics (2-5)

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

ENG 497 Undergraduate Seminar (2-5)

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

ENG 498 Independent Study (2-5)

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

ENG 499 Undergraduate Research (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 towards graduation by enrolling and satisfactorily completing any one of the following courses:

ESPE 301 Aquatics (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) (3) or**ESPE 303 Body Development (W) (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 (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 (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 (3)

Instruction, training and certification in basic life saving swimming skills. (2 hours lecture; 2 hours activity)

ESPE 307 Scuba Diving (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 (3)

Instruction and analysis of creative dance performance as an art form. (2 hours lecture; 2 hours activity)

FINANCE**FIN 301 Finance (5)**

PR: ACCY 103 and ECON 203. Fundamentals of obtaining and administering funds to meet short-term and long-term capital requirements.

FIN 311 Risk and Insurance (5)

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

FIN 321 Investments (3)

PR: ECON 203 or consent of instructor. Principles of determining investment policy for individual and institutional portfolios.

FIN 331 Money and Banking (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 (3)

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 (3)

PR: FIN 301. The operation of financial institutions and an analysis of their role in the economy.

FIN 421 Security Analysis (5)

PR: FIN 301. The problems of selecting securities for various investment purposes.

FIN 431 Financial Management (3)

PR: FIN 301. Analytical techniques for dealing with financial problems and their application to corporate financial management.

FIN 499 Undergraduate Research (2-5)

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

FIN 601 Capital Budgeting and Financial Planning (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 (3)

PR: Graduate standing. Managing cash, receivables and inventories; sources of short-term funds; and special problems such as expansion, contraction, merger and failure.

FRENCH**FRE 101 Elementary French Language and Civilization (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 (3)

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

FRE 103 Elementary French Language and Civilization (3)

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

FRE 201 Intermediate French Language and Civilization (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 (3)

PR: FRE 201 or equivalent. Continuation to FRE 201.

FRE 203 Intermediate French Language and Civilization (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 (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 (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 (3)

PR: FRE 203 or equivalent. Main literary currents and works from the Middle Ages through the Renaissance.

FRE 312 Survey of French Literature (3)

PR: FRE 203 or equivalent. Main literary currents and works of the seventeenth and eighteenth centuries.

FRE 313 Survey of French Literature (3)

PR: FRE 203 or equivalent. Main literary currents and works of the nineteenth and twentieth centuries.

FRE 401 French Phonetics and Diction (2)

PR: FRE 303 or equivalent. French phonology with emphasis on phonic groupings.

FRE 422 Seventeenth Century French Theater (5)

PR: FRE 312. Corneille, Racine, and Moliere. A study of the life and principal works of the authors.

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FRE 431 French Literature of the Eighteenth Century (3)

PR: FRE 312. The philosophical movement: Montesquieu, Vauvenargues, Voltaire, Diderot, Buffon.

FRE 441 Nineteenth Century French Literature (3)

PR: FRE 313. Romanticism.

FRE 442. Nineteenth Century French Literature (3)

PR: FRE 313. Realism and naturalism.

FRE 443 Nineteenth Century French Literature (3)

PR: FRE 313. Parnassianism and symbolism.

FRE 451 Twentieth Century French Literature (5)

Contemporary French drama and poetry.

FRE 453 Twentieth Century French Literature (3)

PR: FRE 313. Contemporary French novel.

FRE 497 Undergraduate Seminar (2-5)

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

FRE 498 Independent Study (2-5)

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

GEOLOGY

GEOL 100 Physical Geology (3)

The earth's materials and the processes by which they interact: crystallography, volcanism, earthquake activity, drifting of continents, movements of the sea floor, sedimentation, erosion, glaciation, and origin of landforms.

GEOL 101 Physical Geology Laboratory (1)

Laboratory exercises involving crystal forms and cleavage, rocks and minerals, sedimentation processes, and linking of geology and landform. Recommended to be taken concurrently with GEOL 100.

GEOL 105 Historical Geology (3)

PR: GEOL 100. The evolution of life on earth as documented by fossil remains. Use of fossils and modern flora and fauna to reconstruct environments of the past.

GEOL 106 Historical Geology Laboratory (1)

Laboratory exercises illustrating the principles of historical geology. Recommended to be taken concurrently with GEOL 105.

GERMAN

GER 101 Elementary German Language and Civilization (3)

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

GER 102 Elementary German Language and Civilization (3)

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

GER 103 Elementary German Language and Civilization (3)

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

GER 201 Intermediate German Language and Civilization (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 (3)

PR: GER 201 or equivalent. Continuation of GER 201.

GER 203 Intermediate German Language and Civilization (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 (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 (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 (3)

The rise of culture and civilization in the West from the earliest times to the eve of the Renaissance.

HIST 202 Western Culture and Civilization (3)

Continuation of HIST 201. Europe from its feudal-manorial state through the Napoleonic era.

HIST 203 Western Culture and Civilization (3)

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 (3)

An introduction to the culturally interrelated problems of American values and institutions; past and present. The historical basis of the evolving institutions of the United States is demonstrated in economic life, government, education, family life, and religion.

HIST 312 American History (3)

Continuation of HIST 311. A topical study of America's evolving political institutions in response to population growth, national wealth, and changing needs and demands 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 (3)

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 330 Latin American History: The Colonial Period (3)

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 (3)

Continuation of HIST 330.

HIST 332 Latin American History: The 20th Century (3)

Continuation of HIST 331.

HIST 412 United States History: 1492-1789 (3)

The history of the British Colonies from their founding until the organization of the U. S. Government under the Constitution.

HIST 413 United States History: 1789-1824 (3)

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 (3)

Administration of Andrew Jackson to the Civil War.

HIST 415 United States History: 1860-1876 (3)

Civil War, Reconstruction, and impact of industrialism.

HIST 416 United States History: 1878-1918 (3)

The Agrarian Revolt, the Spanish-American War, and the Progressive Era.

HIST 417 United States History: 1914-1940 (3)

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 (3)

Contemporary America from World War II.

HIST 420 United States Diplomatic History (5)

The foreign relations of the United States from the founding of the Republic to the present.

HIST 430 Latin American History: The ABC Countries (5)

A survey of the histories of Argentina, Brazil, and Chile from the colonial period to the present.

HIST 452 The Middle Ages and The Renaissance (5)

PR: HIST 201. The ideas and institutions of Medieval Europe; the great cultural and intellectual achievements of the 15th and 16th Centuries in Italy and Northern Europe; the rise of the territorial states; and the effects of nationalism on the political and social structure of Europe.

HIST 455 The Age of the Reformation and the Enlightenment (5)

PR: HIST 202. Europe from the 16th Century to the 18th Century.

HIST 457 Modern Europe: 1789-1918 (5)

HIST 459 Modern Europe: 1918 to the Present (5)

ECON 441 ? 13

HIST 461 Medieval British History: Earliest Times to 1485 (3)

HIST 462 Modern British History: 1485-1815 (3)

HIST 463 Modern British History: 1815 to the Present (3)

HIST 464 British Empire and Commonwealth (3)

The development of the British Empire and Commonwealth since the American Revolution.

HIST 466 British History: Tudor-Stuart Period (3)

A study of the Tudor-Stuart period, with particular emphasis on the civil/religious conflicts of the time.

HIST 470 History of Russia to 1856 (3)

HIST 471 History of Russia: 1856-1917 (3)

HIST 472 History of the Soviet Union: 1917 to the Present (3)

HIST 497 Undergraduate Seminar (2-5)

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

HIST 498 Independent Study (2-5)

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

HIST 499 Undergraduate Research (2-5)

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

HUMANITIES

HUM 301 Western Humanities I (3)

The Graeco-Roman world and the early Middle Ages.

HUM 302 Western Humanities II (3)

PR: HUM 301. The high Middle Ages, the Renaissance, and the early Baroque period.

HUM 303 Western Humanities III (3)

PR: HUM 302. The modern world, from the age of the Enlightenment to the contemporary period.

HUM 311 Egypt and the Near East (3)

The life and thought of ancient civilizations as revealed through art and archaeology.

HUM 315 China and Japan (3)

The art, literature, and thought, as related to religion and custom, during periods of highest achievement.

HUM 317 India and Indonesia (3)

The cultural traditions and the principal monuments in art and literature.

HUM 319 Russia (3)

Outstanding examples of Russian music, dance, drama, and fiction, with attention to the distinctive mixture of cultural influences they reveal.

HUM 335 Afro-American Culture (3)

The artistic influence of the Negro in America.

HUM 351 Latin-American Cultures (3)

The art and archaeological remains of Inca, Mayan, and Aztec civilizations; their influences on Latin-American music, art and literature.

HUM 355 American Ideas I (3)

A history of ideas course using the American Studies approach and emphasizing the significance of Puritanism, capitalism, nationalism, and the idea of progress in the development of American ideals.

HUM 356 American Ideas II (3)

Continuation of HUM 355 with emphasis on the effect of industrialism, pragmatism, individualism, and the cycles of reform and reaction.

HUM 371 Contemporary American Culture (3)

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.

HUM 411 The Classical Temper (3)

An exploration of the meaning of "classical" in architecture, music, painting, sculpture and literature, with attention to various revivals of the style.

HUM 413 The Romantic Mood (3)

A comparative study of selected romantic art works in various periods and places, including modern America.

HUM 415 Realism, Naturalism, and Impressionism (3)

A definition and comparison of these terms as related to various art forms and as seen in selected works from Chaucer to the present.

HUM 421 Purposes of Art I (3)

The variety and evolution of visual arts used for religious purposes from primitive times to modern.

HUM 422 Purposes of Art II (3)

Visual art for non-religious purposes: as a reflection of nature, of authority, of imagination.

HUM 441 Purposes of Music (3)

Religious and social functions of music and its relationships with other arts.

HUM 451 The Epic (3)

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

HUM 455 The Tragic View (3)

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 (3)

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 (3)

A comparative study of the significance of myth in the evolution of folk traditions: Oriental, Near Eastern, Greek, Scandinavian, American.

HUM 473 Confession Literature (3)

A comparative study of works offering insight into the minds and personal lives of influential thinkers from St. Augustine to the present.

HUM 491 Humanities Forum (2)

An elective and open discussion, with variable content, for students in all areas of the University. A selected topic will be discussed each week in a two-hour session.

HUM 496 Special Topics (2-5)

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

HUM 497 Undergraduate Seminar (2-5)

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

HUM 498 Independent Study (2-5)

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

HUMANITIES AND SOCIAL SCIENCES

HSS 490 Senior Seminar: Arts and Social Sciences in Human Affairs (2)

The contemporary world as viewed distinctively by the various disciplines represented in the College of Humanities and Social Sciences. Students may choose the section offered by any one of several departments. 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 Humanities and Social Sciences.

INDUSTRIAL ENGINEERING & MANAGEMENT SYSTEMS

IEMS 311 Engineering Law (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 (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 (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 (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 (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 (3)

PR: ENGR 471. Inventory and replacement models, queueing theory, sequencing, forecasting, dynamic programming.

IEMS 422 Network Analysis (3)

PR: IEMS 435 and ENGR 442. Analysis of networks including: CPM, PERT, GERT, maximum flow problems.

IEMS 423 Analysis of Industrial Operations (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 (3)

PR: ENGR 371. Analysis of queues using analytical and Monte Carlo methods.

IEMS 435 Probability for Engineers (3)

PR: ENGR 371. Combinatorial analysis, sample space, events, probability, discrete and continuous random variables, probability distributions with applications in engineering. (Same as STAT 435).

IEMS 436 Statistics for Engineers (3)

PR: ENGR 371. Significance tests and confidence intervals, tests of hypotheses, simple and multiple regression and correlation with applications in engineering. (Same as STAT 436).

IEMS 442 Engineering Economic Analysis (3)

PR: ENGR 341 and IEMS 435. The engineering economic audit, breakeven point analysis, variable budget control of manufacturing costs, cost analysis, and product pricing.

IEMS 443 Analysis of Decision Processes (3)

PR: ENGR 371 and ENGR 341. Methods of making economic decisions; effects of risk, uncertainty, and strategy on managerial economic decision.

IEMS 451 Human Engineering (3)

PR: Senior standing. Man-machine systems; design and conduct of human engineering studies. Laboratory assignments.

IEMS 452 Human Factors in Space Travel (3)

PR: IEMS 451. Artificial environments and environmental control of upper atmosphere and space.

IEMS 461 System Simulation with Digital Computers (3)

PR: IEMS 361. Methods and procedures for simulating large scale systems with digital computers. FORTRAN and GASP programming languages are used. Laboratory assignments.

IEMS 462 Information Acquisition (3)

PR: IEMS 435. The design of systems to collect data for use in managerial decision models, job evaluation, wage payment, production standards, queueing studies, engineering evaluations and reliability predictions.

IEMS 463 Project Engineering (3)

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

IEMS 464 Design of Industrial Operations (3)

PR: IEMS 331. Planning, analyzing, controlling and evaluating production systems. Laboratory assignments.

IEMS 496 Special Topics (2-5)

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

IEMS 497 Undergraduate Seminar (2-5)

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

IEMS 498 Independent Study (2-5)

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

IEMS 499 Undergraduate Research (2-5)

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

INHALATION THERAPY

Course offerings in Inhalation Therapy, INHT, will be published as a supplement to this Bulletin.

JOURNALISM**JRN 320 Press Photography (3)**

Learning the use of the still camera, darkroom procedures, role of the photographer.

JRN 321 Copy Editing (3)

Fundamental of copy editing for printed media, including selection, processing and display of news.

JRN 322 Information Processing (3)

Planning content and format of newspapers and other periodicals; layout, dummies, departmental editing, copy desk management.

JRN 330 History of Journalism (3)

Development of newspapers and magazines, the press associations and the growth of the electronic media.

JRN 331 Film Criticism (3)

PR: Consent of instructor. The practice of writing movie reviews: students will review at least one film a week during the course.

JRN 420 News Writing (3)

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 421 Editorial and Column Writing (3)

PR: Consent of instructor. Building the editorial page, backgrounding and interpreting the news.

JRN 422 Public Affairs Reporting (3). See page 27.**JRN 423 Writing for the Mass Media (3)**

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.

JRN 424 Critical Writing (3)

PR: Consent of instructor. Practice in writing reviews of plays, concerts, and books.

JRN 425 Feature Writing (3)

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

JRN 426 Public Relations (3)

Principles and practice of public relations, the means of gaining publicity and influencing people.

JRN 427 Public Relations Campaigns (3)

The planning and execution of a public relations campaign; use of research and coordination of elements of the campaign.

JRN 431 International Communications and the Foreign Press (3)

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 (3)

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 (3)

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

JRN 434 Principles of Advertising (3)

Fundamentals of advertising theory and practice including social and economic aspects.

JRN 435 Advertising Media (3)

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 (3)

PR: Consent of instructor. The writing and preparation of copy for advertisements.

JRN 437 Advertising Campaigns (3)

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 (2-5)

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

JRN 498 Independent Study (2-5)

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

LIBRARY SCIENCE**LIB 301 Library Materials (3)**

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

LIB 321 Library Organization and Administration I (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.

LIB 322 Library Organization and Administration II (3)

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

LIB 334 Selection and Acquisition of Library Materials (3)

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

LIB 384 History of Books and Libraries (3)

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

LIB 424 School Library Administration (3)

PR: LIB 322. Principles and practices of library administration applied to elementary and secondary school libraries.

LIB 431 Cataloging and Classification I (3)

PR: LIB 321. 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.

LIB 432 Cataloging and Classification II (3)

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.

LIB 444 Reference Materials and Services (3)

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

LIB 451 Introduction of Educational Media (4)

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

LIB 452 Preparation and Production of Instructional Media (3)

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

MANAGEMENT**MGMT 301 Management (5)**

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

MGMT 324 Production Management (5)

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

MGMT 344 Organization Theory (5)

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

MGMT 347 Human Relations in Management (3)

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

MGMT 364 Personnel Management (5)

PR: MGMT 301. An investigation of personnel practices and interpersonal relationships involved in managing employees. Internal problems of labor control and the utilization of human resources are considered.

MGMT 367 Industrial Relations (3)

PR: MGMT 301. 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 (3)

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

MGMT 464 Personnel Problems (3)

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 (2-5)

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

*May not be offered before 1971.

MGMT 601 Management Process (3)

PR: Graduate standing. Theory of management for complex organizations.

MGMT 611 Organizational Behavior (3)

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

MARKETING**MKTG 301 Marketing (5)**

PR: ECON 203. Study of functions, institutions and basic problems in marketing of goods and services in our economy.

MKTG 324 Marketing Environment (3)

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 (3)

PR: MKTG 301 and PSY 308. An analysis of consumer motivation, buying behavior, market adjustment and product innovation. This course is concerned with the behavioral aspects of the marketing process from the producer to the ultimate user or consumer.

MKTG 334 Pricing Policies (3)

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 (3)

PR: MKTG 301 and ECON 321 or BADM 311. The ecology, analysis and development of integrated distribution systems; the application of quantitative tools, economic analysis, transportation and marketing management in the analysis and interpretation of the design and physical flow of goods through marketing network alternatives.

MKTG 364 Advertising Management (3)

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

*May not be offered before 1971.

MKTG 367 Sales Management (3)

PR: MKTG 301. Problems confronting sales manager; training in sales techniques; sales objectives and policies; organization; and administration of sales force.

MKTG 384 Marketing Research (5)

PR: MKTG 301 and ECON 321. Study of research procedures and techniques applicable to problem solving in marketing. The marketing management process is analyzed; the underlying concepts related to the information needed to serve the processes are explored; and the incorporation of information resources into the management function is demonstrated.

MKTG 469 Advertising and Sales Management (3)

PR: MKTG 364, MKTG 367, and PSY 308. Managerial approach to advertising and sales management. Designed to acquaint the student with the methods of demand analysis and its application to the interrelationship to marketing management, advertising management, and sales management.

MKTG 495 Marketing Policies and Strategies (3)

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

MKTG 499 Undergraduate Research (2-5)

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

MKTG 601 Marketing Policy (3)

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

MATHEMATICS**MATH 100 Principles of Mathematics (4)**

PR: Two years of high school mathematics. A study of some topics in mathematics with primary emphasis on developing conceptual understanding and broadening insights into mathematics. Designed specifically for use in the Environmental Studies Program.

MATH 104 Elementary Mathematics (3)

PR: Two years of high school mathematics. Properties of numbers; factoring; fractions; solution of linear and quadratic equations; systems of equations; graphing; problem solving. For those students whose preparation in mathematics is insufficient for MATH 106, 108 or 115.

*May not be offered before 1971.

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MATH 106 College Algebra (5)

PR: MATH 104 or three years of high school mathematics including two in algebra. Algebraic and transcendental functions; sequences; inequalities; determinants; permutations; combinations; mathematical induction; partial fractions.

MATH 108 Analytic Trigonometry (3)

PR: MATH 104 or two years of high school algebra, and one year of high school plane geometry. The circular functions and their identities; inverse circular functions; equations and inequalities involving circular functions; graphs of the circular functions and their inverses; functions of angles; complex numbers.

MATH 110 Elementary Functions (5)

PR: Two years of high school algebra and one year of plane geometry and one half year of trigonometry. Properties of algebraic and transcendental functions; inequalities and related topics.

MATH 115 Finite Mathematics (5)

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 (3)

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 221,222,223 Calculus with Analytic Geometry (4,5,5)

PR: MATH 110, or MATH 106 and 108, or the equivalent. Analytic geometry; functions; limits; continuity; derivatives; antiderivatives; definite integrals; calculus of transcendental functions; techniques of integration; indeterminate forms; vectors.

MATH 314 Boolean Algebra (4)

PR: MATH 223 or consent of instructor. Axiomatic development of Boolean algebra; the algebras of sets, logic and circuits as Boolean algebras.

MATH 315,316 Introduction to Number Theory (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 (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 (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 and Analytic Geometry (5)

PR: MATH 223. Solid analytic geometry; functions of several variables; partial derivatives; infinite sequences and series; vector calculus; line and surface integrals; multiple integrals.

MATH 331 Differential Equations (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 (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 (3,3)

PR: Consent of instructor. Euclidean geometry; geometry of transformations; projective and other non-Euclidean geometries.

MATH 411,412,413 Algebraic Structures (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 (3)

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

MATH 420 Sequences and Series (3)

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

MATH 421,422,423 Advanced Calculus (3,3,3)

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

MATH 424 Lebesgue Theory (3)

PR: MATH 423. Inner and outer measure; measurable sets and functions; the Lebesgue integral.

MATH 425 Techniques of Complex Variables (3)

PR: MATH 321. Analytic functions; integration in the complex plane; Laurent series and residue calculus, inversion of Laplace transforms; conformal mappings; applications in engineering and the physical sciences.

MATH 426,427 Theory of Complex Variables (3,3)

PR: MATH 425. Analytic and harmonic functions; Cauchy's theorem and its implications; the maximum modulus principle; series expansions; decomposition of meromorphic functions into partial fractions; analytic continuation; asymptotic expansions; the Mittag-Leffler Theorem; integral functions of finite order; Riemann surfaces.

MATH 428 The Number System (3)

PR: 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.

MATH 429 Foundations of Calculus (3)

PR: 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.

MATH 431 Ordinary Differential Equations (3)

PR: MATH 331. Systems of equations; the Wronskian; Abel's identity; integrating factors and adjoint equations.

MATH 432 Theory of Differential Equations (3)

PR: MATH 331. The existence and uniqueness of solutions; oscillation theory; asymptotic solutions; stability.

MATH 434 Partial Differential Equations (3)

PR: MATH 331. Separation of variables; orthogonality and Fourier series; classification of equations; solutions in different coordinate systems; methods of characteristics; the Fourier integral transform and Dirac's delta function.

MATH 435 Boundary Value Problems (3)

PR: MATH 434. Adjoint forms and Green's functions; applications in engineering and the physical sciences.

MATH 436 Special Functions (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 (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 (3)

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

MATH 461 Basic Topology (3)

PR: MATH 421 or 428. Compactness; connectedness; general metric spaces; topological spaces; limit points.

MATH 462 Concepts in Topology (3)

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

MATH 490 History of Mathematics (3)

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

MATH 491 Contemporary Mathematics (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 (2-6)

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

MATH 497 Undergraduate Seminar (2-6)

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

MATH 498 Independent Study (2-6)

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

MATH 499 Undergraduate Research (2-6)

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

MECHANICAL ENGINEERING & AEROSPACE SCIENCES**MEAS 341 Mechanisms (2)**

PR: ENGR 311. Relative motions of machine parts; cams, rolling contact, gearing, and flexible connectors. Synthesis of mechanisms. One lecture, three hours laboratory.

MEAS 342 Dynamics in Design (2)

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

MEAS 351 Measurement Systems Engineering (3)

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

MEAS 371 Fluid Mechanics (3)

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 (3)

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

MEAS 411 Aerodynamics (3)

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

MEAS 413 Stability and Control (3)

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

MEAS 421 Space Mechanics (3)

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

MEAS 423 Vibration Analysis (3)

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

MEAS 424 Flight Vehicle Structures (3)

PR: CEES 351. Space structures; thin-walled structures; load factors; non-symmetrical bending and transverse shear; shear center and shear flow; semi-monocoque construction, fuselage rings; multicelled structures; sandwich panels, fatigue.

MEAS 432 Propulsion Systems (3)

PR: MEAS 372. Analysis of jet propulsion systems including turbojets, ramjets, and rockets.

MEAS 436 Mechanical Power Systems (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 (3)

PR: MEAS 372 and PHYS 344. Unconventional methods of energy conversion; particular emphasis on fuel cells, thermo-electrics, thermionics, solar energy, photovoltaics, nuclear, and magnetohydrodynamics.

MEAS 441 Principles of Design (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 (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 (3)

PR: ENGR 331. Statistical approach to thermodynamic concepts, laws, and methods of analysis. Generalized $p-v-T$ data. Special systems.

MEAS 472,473 Heat Transfer (3)

CR: MEAS 371. Steady and unsteady heat conduction in one and two dimensions. Application of boundary layer analysis and thermodynamics to forced and free convection of heat. Introduction to radiation concepts.

MEAS 496 Special Topics (2-5)

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

MEAS 497 Undergraduate Seminar (2-5)

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

MEAS 498 Independent Study (2-5)

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

MEAS 499 Undergraduate Research (2-5)

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

MEDICAL TECHNOLOGY

Course offerings in Medical Technology, MEDT, will be published as a supplement to this Bulletin.

MEDICAL RECORDS SCIENCE

Course offerings in Medical Records Science, MRSC, will be published as a supplement to this Bulletin.

MICROBIOLOGY**MICR 200 General Microbiology (3)**

PR: 8 hours in biological sciences. Fundamentals of microbiology, morphology, metabolism.

MICR 201 General Microbiology Laboratory (1)

Laboratory procedures and principles in microbiology; taken concurrently with MICR 200.

MICR 210 Culture Media and Reagents (2)

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

MICR 220 Sanitary Science and Public Health (3)

PR: BIOL 100. Theories of diseases; sanitary procedures in water purification; sewage disposal, refuse collection; milk supplies; swimming pools; air contamination; personal and public health.

MICR 300 Advanced General Microbiology (4)

PR: MICR 200. Advanced fundamental theory and technique.

MICR 320 Pathogenic Microbiology (4)

PR: MICR 200. Microorganisms producing disease in man and other animals; means of transmission; protection against disease.

MICR 322 Microbiology of Water and Sewage (4)

PR: MICR 200. Organisms in water and their relationship to production and distribution of potable water; disposal of sewage.

MICR 350 Soil Microbiology (4)

PR: MICR 200. Soil microorganisms and their role in ammonification, nitrification, and biological processes.

MICR 430 Microbial Physiology (4)

PR: MICR 300. Relationship between structure and function in microorganisms.

MICR 440 Determinative Microbiology (4)

PR: 11 hours in microbiology. Microbial classification, rules of nomenclature, bacterial code and identification of species.

MICR 470 Virology (4)

PR: 12 hours of microbiology and CHEM 123. Nature of viruses and Rickettsiae including their structure, propagation, isolation, and identification.

MICR 496 Special Topics (2-5)

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

MICR 497 Undergraduate Seminar (2-5)

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

MICR 498 Independent Study (2-5)

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

MICR 499 Undergraduate Research (2-5)

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

MUSIC

Courses are classified as follows:

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

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

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

FEES: Each course involving private lessons has a music fee of \$12.50 per quarter hour credit. Class Piano MUS 111 has no music fee.

MUS 101,102,103 Music Theory (3,3,3)

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

MUS 104,105,106 Music Literature (2,2,2)

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

MUS 111 Class Piano (2)

May be repeated for credit.

MUS 112 Voice (1)

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

MUS 113 String (1)

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

MUS 114 Woodwind (1)

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

MUS 115 Brass (1)

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

MUS 116 Percussion (1)

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

MUS 117 Organ (1)

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

MUS 118 Piano (1)

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

MUS 201,202,203 Music Theory (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 211 Piano (2)

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

MUS 212 Voice (2)

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

MUS 213 String (2)

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

MUS 214 Woodwind (2)

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

MUS 215 Brass (2)

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

MUS 216 Percussion (2)

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

MUS 217 Organ (2)

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

MUS 218,219,220 Piano Literature (2,2,2)

PR: Proficiency in an applied instrument or voice (200 level or above) or consent of instructor. Survey of stringed keyboard literature from the sixteenth century to the present with emphasis on technical, formal and performance problems.

MUS 221,222,223 Song Literature (2,2,2)

PR: Proficiency in an applied instrument or voice (200 level or above) or consent of instructor. Survey of the development of the art song from the middle ages to the present with emphasis on technical, formal and performance problems.

MUS 301,302,303 Counterpoint (3,3,3)

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

MUS 304 Madrigal Singers (1)

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

MUS 307 Concert Choir (1)

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

MUS 308 Band (1)

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 (1)

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 311 Piano (2)

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

MUS 312 Voice (2)

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

MUS 313 String (2)

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

MUS 314 Woodwind (2)

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

MUS 315 Brass (2)

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

MUS 316 Percussion (2)

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

MUS 317 Organ (2)

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

MUS 320,321,322 Orchestration (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 (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 (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 390 Fundamental Music Skills (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 (3)

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

MUS 401,402,403 Form and Analysis (3,3,3)

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

MUS 411 Piano (2)

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

MUS 412 Voice (2)

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

MUS 413 String (2)

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

MUS 414 Woodwind (2)

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

MUS 415 Brass (2)

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

MUS 416 Percussion (2)

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

MUS 417 Organ (2)

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

MUS 421 Piano (2-5)

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

MUS 422 Voice (2-5)

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

MUS 423 String (2-5)

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

MUS 424 Woodwind (2-5)

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

MUS 425 Brass (2-5)

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

MUS 426 Percussion (2-5)

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

MUS 427 Organ (2-5)

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

MUS 450,451,452 Music of the Twentieth Century (3,3,3)

Problems of contemporary style; electronic methods, literary and technical points of view; analysis of selected works from Satie, Debussy, Ravel, Stravinsky, Bartok, Schoenberg, Berg, Webern, Cage, Babbitt, Badings, Carter, Ives, Stockausen, Messiaen, Xenakis, Varese, Henze and others.

MUS 496 Special Topics (2-5)

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

MUS 497 Undergraduate Seminar (2-5)

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

MUS 498 Independent Study (2-5)

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

PHILOSOPHY**PHI 205 Introductory Logic (3)**

Basic analysis of patterns of inference; examination of logical forms; development of elementary techniques for assessing validity of inferences.

PHI 221 Introduction to Philosophy (3)

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 Logic (3)

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 321 Greek and Roman Philosophy (3)

The emergence of enduring philosophical questions, critical thought, and metaphysical speculation from the pre-Socratics to Neoplatonism, with particular emphasis on Socrates, Plato and Aristotle.

PHI 323 Medieval and Renaissance Philosophy (3)

Survey of Scholasticism; the fusion of philosophy and religion; emergence of independence in philosophical thinking; naturalism and humanism; transition to the modern period. Consideration of such philosophers as Aquinas, Bacon, Hobbes.

PHI 325 Philosophy of the Enlightenment (3)

Development of rationalism and empiricism in the 17th and 18th centuries. Attention to major philosophers of the period, including Descartes, Locke, Hume, Kant.

PHI 327 Nineteenth-Century Philosophy (3)

Development of idealism, materialism, positivism and utilitarianism. Consideration of such philosophers as Hegel, Marx, Comte, Nietzsche, Mill.

PHI 329 Twentieth-Century Philosophy (3)

Development of pragmatism, logical positivism, linguistic analysis, phenomenology, existentialism, process philosophy. Major issues in contemporary philosophy.

PHI 429 Existentialism (3)

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 496 Special Topics (2-5)

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

PHYSICS**PHYS 103 Astronomy (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 (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 (1)

PR: PHYS 107. Laboratory experimentation and instruction covering selected topics in physics. Three hours per week.

PHYS 211,212,213 General Physics (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 (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 (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 (1,1)

PR: PHYS 211. Laboratory experimentation and instruction covering selected topics in physics. Three hours per week.

PHYS 287,288,289 Physical Measurements (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 321,322,323 Mechanics (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 (3,3,3)

PR: PHYS 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 (3,3)

PR: PHYS 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 (3,3,3)

PR: PHYS 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 Engineers (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 (3,3)

PR: PHYS 213 or PHYS 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 (3,3)

PR: PHYS 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 (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 (3,3)

PR: PHYS 213 or PHYS 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 (3)

PR: PHYS 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.

PHYS 382 Physics Laboratory – Electricity and Magnetism (3)

PR: PHYS 213 or consent of instructor. Lecture and laboratory work in basic electrical measurements, measurement of e/m , transmission lines, microwaves, and Zeeman effect.

PHYS 383 Physics Laboratory – Nuclear Physics (3)

PR: PHYS 213 or consent of instructor. Lecture and laboratory work in nuclear physics stressing nuclear radiation and the interaction of radiation with matter.

PHYS 384 Physics Laboratory – Optics and Wave Motion (3)

PR: PHYS 213 or consent of instructor. Lecture and laboratory work in basic optics and wave phenomena. Selected experiments in interference and diffraction of waves, polarized light, spectroscopy, microwaves, and optical pumping.

PHYS 385 Physics Laboratory – Modern and Solid State Physics (3)

PR: PHYS 213 or consent of instructor. Lecture and laboratory work in selected areas of modern and solid state physics. A study of electrical conductivity in solids, temperature dependence in semiconductors, Hall effect, and electron mobility.

PHYS 461 Solid State Physics (3)

PR: PHYS 343 or consent of instructor. Properties of solids, crystal binding, free electron model, band theory of solids, Fermi surface, and solid state applications.

PHYS 471,472 Quantum Mechanics (3,3)

PR: PHYS 343 or consent of instructor. A study of the postulates of quantum mechanics, the Schrodinger equation, and an introduction to the statistics of many particle systems.

PHYS 475 Statistical Physics (3)

PR: PHYS 343 or consent of instructor. An introduction to thermodynamics, statistical mechanics, and kinetic theory.

PHYS 491 Contemporary Physics (3)

PR: Consent of instructor. Concepts, experiments, problems and advanced topics included in courses such as PSSC physics and other modern approaches to secondary school physics. For prospective teachers of physics. (Same as EDSE 494)

PHYS 496 Special Topics (2-5)

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

PHYS 497 Undergraduate Seminar (2-5)

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

PHYS 498 Independent Study (2-5)

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

PHYS 499 Undergraduate Research (2-5)

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

POLITICAL SCIENCE

PCL 201 American National Government (3)

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

PCL 203 Principles of Political Science (3)

The scope of political science and its development as a field with emphasis on areas of concern; analysis of the major approaches to the study of politics; familiarization with recent developments in research and research techniques.

PCL 301 American State and Local Government (3)

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 (3)

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 (3)

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 (3)

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 (3)

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 (3)

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 (3)

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 (3)

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 (3)

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 (3)

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

PCL 405 Political Theory (3)

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

PCL 410 Public Administration (3)

PR: PCL 201, 203 or consent of instructor. Analysis of administrative theories and of the processes by which public policies are implemented in a democratic society.



PCL 413 Metropolitan Politics (3)

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

PCL 427 American Foreign Policy (3)

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 (3)

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

PCL 433 International Law (3)

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

PCL 461 Political Philosophy (3)

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 (3)

PR: PCL 201, 203 or consent of instructor. Renaissance to the 19th Century.

PCL 463 Political Philosophy (3)

PR: PCL 201, 203 or consent of instructor. Study of contemporary Western political and social thought in the 19th and 20th Century.

PCL 471 American Constitutional Law (5)

PR: PCL 201, 203 or consent of instructor. The impact of judicial decision-making upon the growth of American political institutions and processes.

PCL 473 American Constitutional Law (5)

PR: PCL 201, 203 or consent of instructor. The role of the judiciary in the focusing and refinement of individual rights and civil liberties in American society.

PCL 497 Undergraduate Seminar (2-5)

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

PCL 498 Independent Study (2-5)

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

PCL 499 Undergraduate Research (2-5)

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

PSYCHOLOGY

PSY 201,202 General Psychology (3,3)

The basic principles, theories, and methods of contemporary psychology.

PSY 300 Applied Psychology (4)

Applications of principles of psychology to problems of human development, personal and social adjustment, career choice and satisfaction.

PSY 301 Basic Learning Processes (4)

PR: PSY 201, 202. A survey of theories and research findings from basic laboratory investigation of learning phenomena. Lec-lab.

PSY 302 Complex Human Learning (4)

PR: PSY 301. Selected topics from theories and research on complex human learning and problem solving. Lec-lab.

PSY 303 Physiological Psychology (4)

PR: PSY 201, 202. Physiological bases and correlates of behavior. Lec-lab.

PSY 304 Perception (4)

PR: PSY 201, 202. Consideration of physical and psychological variables in perceptual phenomena. Lec-lab.

PSY 305 Psychological Measurement (4)

PR: PSY 201, 202, STAT 201. Theory of test construction and consideration of selected measures of psychological characteristics.

PSY 306 Psychology of Adjustment (4)

Psychological principles of adjustment, application of psychology to problems in living.

PSY 307 Motivation (4)

PR: PSY 201, 202. Psychological and physiological aspects of human motivation.

PSY 308 Social Psychology (4)

PR: PSY 201, 202. Effects of social situations and social variables on the behavior of individuals.

PSY 309 Personality Theory (4)

PR: PSY 201, 202. A survey of theory and research on the development of personality characteristics. Lec-lab.

PSY 310 Abnormal Psychology (4)

PR: PSY 309. Classification, causation, and treatment of deviant patterns of behavior.

PSY 311 Methods of Psychological Research (3)

PR: PSY 201, 202. Critical evaluation of research methods in psychology, considerations of internal and external validity.

PSY 312 Clinical Psychology (4)

PR: PSY 310. Consideration of psychodiagnostics, behavioral modification techniques and clinical research. Lec-lab.

PSY 313 Developmental Psychology (4)

The effects of genetic, psychological, maturational, and social factors on behavior at various stages of development.

PSY 314 Industrial Psychology (4)

PR: PSY 201, 202, STAT 201. Psychological principles of employee selection, training, and morale.

PSY 401 Senior Research Proposal (2)

PR: STAT 401 and senior standing. Study in depth of bibliography and methods of psychological research. Each student will write, and have approved, a proposal for an original piece of research.

PSY 405 History and Systems of Psychology (4)

PR: PSY 301, 309. Historical development of psychology with emphasis on classical theoretical positions.

PSY 497 Undergraduate Seminar (2-5)

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

PSY 498 Independent Study (2-5)

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

PSY 499 Undergraduate Research (8)

PR: Consent of instructor.

RADIO/TELEVISION

RTV 140 Radio-Television I (3)

Nature of the media, the mechanics of operation, history, economics, programming, and internal and external controls.

RTV 240 Audio Production I (3)

Sound recording; acoustics; and music and effects, both live and recorded, for radio and television. (Laboratory hours to be arranged).

RTV 241 Television Production I (3)

Studio operation; available means of presentation: Studio, lights, sets, graphics, cameras, audio, switching, and tape recording. (Laboratory hours to be arranged).

RTV 340 Audio Production II (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. (Laboratory hours to be arranged).

RTV 341 Television Production II (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. (Laboratory hours to be arranged).

RTV 342 Broadcast Journalism I (3)

Examination of the historical, legal, and quasi-legal influences on broadcast news; introduction to news sources, writing, and interviewing techniques for radio-television news.

RTV 344 Broadcast Continuity and Programming I (3)

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 (3)

Principles and practices of 8mm and 16mm film usage within the television industry.

RTV 346 Radio, Television, and Society (3)

A study of the impact of electronic media upon the habits, customs, and thinking of our times. Considerations of internal media problems.

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RTV 351 Radio Production and Directing (3)

PR: RTV 340. Techniques and practice in producing and directing radio programs. (Laboratory hours to be arranged).

RTV 441 Television Production and Directing (3)

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. (Laboratory hours to be arranged).

RTV 444 Broadcast Continuity and Programming II (3)

PR: RTV 344 or consent of instructor. Preparation of documentaries and dramatic writing for radio and television.

RTV 445 Television Film Production (3)

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

RTV 448 Broadcast Regulations (3)

PR: RTV 14Q or RTV 342. Federal, state, local and self-regulatory agencies and practices which govern electronic media.

RTV 450 Broadcast Journalism II (3)

PR: JRN 321, for radio-television concentrates, RTV 342. Principles and practice of news preparation for electronic media. (Laboratory hours to be arranged).

RTV 451 Radio-Television Advertising (3)

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 (3)

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 (3)

PR: Consent of instructor. The 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 (3)

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. (Laboratory hours to be arranged).

RTV 457 Broadcast Internship (12-15)

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 (3)

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

RTV 496 Special Topics (2-5)

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

RTV 498 Independent Study (2-5)

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

RELIGION**REL 301 Comparative Religions I (3)**

The religions of China and Japan, their concepts, philosophy, and rituals.

REL 302 Comparative Religions II (3)

The religions of India and Southeast Asia.

REL 303 Comparative Religions III (3)

The religions of the Near East.

REL 321 Religion in America (3)

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 (3)

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 (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 (3)

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

RUS 103 Elementary Russian Language and Civilization (3)

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

RUS 201 Intermediate Russian Language and Civilization (3)

PR: RUS 103 or equivalent. Designed to continue development of language skills at the intermediate level, together with a review of grammar, study of syntax, idiomatic expressions, extensive reading, and further study of Russian culture.

RUS 202 Intermediate Russian Language and Civilization (3)

PR: RUS 201 or equivalent. Continuation of RUS 201.

RUS 203 Intermediate Russian Language and Civilization (3)

PR: RUS 202 or equivalent. Continuation of RUS 202 with greater emphasis on Russian civilization from the Middle Ages to the present.

RUS 301 Russian Composition (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 (4)

PR: RUS 203 or equivalent. Development of skills in conversation and comprehension through practice and systematic review of phonology and grammatical structure.

SCIENCE**SCI 490 Senior Seminar: Science in Human Affairs (2)**

The impact of science on modern society. This course, primarily intended for the senior student, is offered as one of the Advanced Environmental Studies seminars. Not open to students majoring in the College of Natural Sciences.

SOCIOLOGY

Introductory Sequence: SOC 201, 202.

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

Social Psychology Area: SOC 321, 322, 352, 353, 354, 451.

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

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

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

SOC 201,202 General Sociology (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 (5)

PR: SOC 201, 202. An overview of theories concerning the nature of man as a "social being" and of the nature of society, from the classical Greek-Roman period to the Second World War.

SOC 306 Modern Sociological Thought (5)

PR: SOC 201, 202, 304. A study of the major European and American contributors to, and "schools" of modern sociology from the Second World War to the present. Comte, Spencer, Mill, Durkheim, Weber, Simmel, Pareto, Ward, Giddings, Thomas, Small, Sorokin, Parsons, Merton.

SOC 307 The Sociology of Religion (3)

Patterns in religious behavior in various societies with primary emphasis on myth, rite, taboo and festival as social phenomena.

SOC 321,322 General Anthropology (3,3)

An introduction to the principles of anthropology. The nature of culture and of culturally derived norms of human behavior. The various aspects of anthropology, human pre-history, physical anthropology, culture and personality, anthropological linguistics.

SOC 325 Urban Sociology (5)

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 (3)

PR: SOC 201, 202. Rural American life, its resources, and the problems of changing patterns of rural social structure.

SOC 331 Social Problems (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 (5)

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 (3)

Social institutions, social differentiation, and social control, with emphasis on American and other modern societies.

SOC 340 Social Welfare: A Social Institution (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 (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 (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 (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 (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 (5)

PR: SOC 201, 202 345. Chief causes of anti-social behavior and current methods of prevention and reform. Effects of heredity and environment, prevalence of delinquency and crime, penal institutions.

SOC 348 Sociology of Alcoholism (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 (3)

Sociological, economic and political forces giving rise to and resulting from decisions of the Supreme Court.

SOC 352 Intergroup Conflict and Prejudice (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 353 Culture and Personality (3)

PR: SOC 201, 202. Theories of the variations in personality in relation to culture and group life in tribal and modern societies.

SOC 354 The Sociology of Adolescence (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 407 The Family (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 411 Demography (3)

PR: SOC 201, 202. Concerned with the study of human population, its distribution, composition and change.

SOC 412 Field Experience and Seminar (5)

PR: SOC 340, 341, 342, 343 and Senior Standing. Supervised learning experiences in local social agencies relating theory and academic preparation with practice. Eight hours per week plus two hour weekly seminar.

SOC 416 Human Ecology (3)

Principles governing the spatial distribution of human populations and activities within an area.

SOC 451 Contemporary Social Movements (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 496 Special Topics (2-5)

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

SOC 498 Independent Study (2-5)

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

SOC 499 Undergraduate Research (2-5)

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

SPANISH

SPA 101 Elementary Spanish Language and Civilization (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 (3)

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

SPA 103 Elementary Spanish Language and Civilization (3)

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

SPA 201 Intermediate Spanish Language and Civilization (3)

PR: SPA 103 or equivalent. Designed to continue development of language skills at the intermediate level, together with a review of grammar, study of syntax, idiomatic expressions, extensive reading, and further study of Spanish culture.

SPA 202 Intermediate Spanish Language and Civilization (3)

PR: SPA 201 or equivalent. Continuation of SPA 201.

SPA 203 Intermediate Spanish Language and Civilization (3)

PR: SPA 202 or equivalent. Continuation of SPA 202 with greater emphasis on Spanish civilization from the Middle Ages to the present.

SPA 301 Spanish Composition (4)

PR: SPA 203 or equivalent. Development of skills in composition through systematic review of grammar, syntax and development of style. Free and controlled written composition required.

SPA 303 Spanish Conversation (4)

PR: SPA 203 or equivalent. Development of skills in conversation and comprehension through practice and systematic review of phonology and grammatical structure.

SPA 311 Survey of Spanish Literature (3)

PR: SPA 203 or equivalent. Main literary currents and works from the Middle Ages through the Renaissance and Baroque.

SPA 312 Survey of Spanish Literature (3)

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

SPA 313 Survey of Spanish Literature (3)

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

SPA 316 Survey of Latin-American Literature (3)

PR: SPA 203 or equivalent. Main literary currents and works from the colonial period through the struggle for independence.

SPA 317 Survey of Latin-American Literature (3)

PR: SPA 203 or equivalent. Main literary currents and works from the second half of the nineteenth century to the present.

SPA 401 Spanish Phonetics and Diction (2)

PR: SPA 303 or equivalent. Spanish phonology with emphasis on phonic groupings.

SPA 421 Golden Age Drama (3)

PR: SPA 311. A study of the drama of the Golden Age with special emphasis on Lope, Tirso, Alarcón, and Calderón. The controversies on the Spanish theatre and its influence abroad.

SPA 423 Cervantes (3)

PR: SPA 311. *Don Quixote*.

SPA 441 Nineteenth-Century Spanish Literature (3)

PR: SPA 312. Romanticism in Spanish literature.

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SPA 442 Nineteenth-Century Spanish Literature (3)

PR: SPA 312. The realistic and naturalistic novel in Spain.

SPA 443 The Generation of 1898 (3)

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

SPA 451 Twentieth-Century Spanish Literature (3)

PR: SPA 313. The contemporary Spanish novel.

SPA 452 Twentieth-Century Spanish Literature (5)

PR: SPA 313. Contemporary Spanish drama and poetry.

SPA 497 Undergraduate Seminar (2-5)

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

SPA 498 Independent Study (2-5)

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

SPEECH

SPE 101 Fundamentals of Oral Communication (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 (3)

Physiological description and visual notation of speech sounds; regional dialects of American English.

SPE 262 Psychology of Oral Communication (3)

Psychological principles involved in the communicative process with application to individuals and groups.

SPE 360 Persuasion: Argumentation (3)

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 (3)

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 (3)

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 Discussion (3)

Nature of discussion and conference, problem analysis, duties of the participants, function of leader, and participation in various group situations.

SPE 365 Parliamentary Procedure (2)

Principles and rules governing participation and leadership in the conduct of informal business meetings.

SPE 370 Directing Extracurricular Speech Activities (3)

Debate, extemporaneous speech and other speech events; selection and training of contestants; interschool and intramural speech activities.

SPE 371 Speech and Human Relations (3)

Introduction to semantics; symbols and meaning and the relationship with human behavior.

SPE 460 Group Dynamics (3)

PR: SPE 363 or consent of instructor. A study of human behavioral problems in various conference and group situations.

SPE 461 Studies in Modern Oral Communication Theory (3)

Comparative study of the views of modern rhetorician and oral communication theorists.

SPE 462 Persuasion (3)

PR: SPE 360. 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 (3)

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 (3)

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 470 History and Criticism of American Public Address (3)

Rhetorical criticism of speaking and writing of American statesmen that have had an influence on political, social, and economic milieu of their times.

SPE 471 History and Criticism of British Public Address (3)

Rhetorical criticism of speaking and writing of British statesmen that have had an influence on political, social, and economic milieu of their times.

SPE 496 Special Topics (2-5)

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

SPE 498 Independent Study (2-5)

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

STATISTICS

STAT 201 Principles of Statistics (4)

PR: Two years of high school mathematics or one course of college mathematics. 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 321 Business & Economic Statistics (4)

PR: ECON 203, MATH 115, and STAT 201. 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 332 Statistical Quality Control (3)

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

STAT 335 Probability and Statistics for Engineers (3)

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

STAT 341,342,343 Mathematical Statistics (3,3,3)

PR: MATH 223. 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 (4,4)

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

STAT 411 Experimental Design (3)

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

STAT 421 Survey Design (3)

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

STAT 435 Probability for Engineers (3)

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

STAT 436 Statistics for Engineers (3)

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

STAT 447,448 Probability Theory and Applications (3,3)

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

STAT 496 Special Topics (2-5)

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

STAT 497 Undergraduate Seminar (2-5)

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

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STAT 498 Independent Study (2-5)

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

STAT 499 Undergraduate Research (2-5)

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

THEATRE**THA 180 Study of Drama and Theatre (3)**

Nature of drama and the theatre, and basic principles of play analysis.

THA 220,221,222 Theatre Practice I (1,1,1)

Introduction to stagecraft, lighting, properties, costume design. (Laboratory hours to be arranged and practical experience on technical crews as required).

THA 230 Interpretation I (3)

Analysis of thought; development of imagination; oral presentation of literary forms; individual problems in interpretive reading. (Recommended for students majoring in English and preparing to teach literature).

THA 283,284,285 Acting I (1,1,1)

Study and practical experience in problems of creating characterization, with emphasis on developing vocal and physical skill in acting.

THA 320,321,322 Theatre Practice II (1,1,1)

PR: THA 220, 221, Or 222. Practical experience in designing and operating technical aspects of dramatic productions. (Service on crews is required).

THA 330 Interpretation II (3)

PR: THA 230 or the equivalent and junior standing. Selecting and abridging literary material for platform use; preparation and presentation of program for special and general occasions.

THA 331 History of the Theatre: Classic and Renaissance (3)

Development of theatre art from the earliest times through the sixteenth century.

THA 332 History of the Theatre: Seventeenth to the Twentieth Century (3)

Development of theatre art from the beginning of the seventeenth century through the nineteenth century.

THA 333 History of the Theatre: Staging and Architecture (3)

Study of costume and staging from earliest times to the present.

THA 334 Techniques of the Motion Picture (3)

PR: Consent of instructor. An examination of the techniques of motion picture art: directing, acting, editing, tempo, rhythmic.

THA 380 Directing I (3)

Fundamental principles of play-directing; demonstrations of theory in group exercises. Each student is required to direct two short scenes for laboratory presentation and criticism. (Laboratory hours to be arranged, and work in departmental productions).

THA 381 Scene Design I (3)

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 (3)

PR: Junior standing. Study of stage lighting techniques, practices, and equipment. (Service on light crew is required).

THA 421 Dramatic Theory (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 (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 (3)

Trends in theatrical production and dramatic literature in Italy, France, Germany, Russia, and the Scandinavian countries.

THA 424 An Aesthetic of the Motion Picture (3)

PR: THA 334 or COM 310 or RTV 345, or consent of instructor. An aesthetic consideration of the motion picture as art; critical criteria and stylistic comparisons will be established through viewing of films, reading assignments, and discussion.

THA 425 Dramatic Criticism (3)

PR: Consent of instructor. Analysis of the nature of past and present day criticism of the drama; practical work in such criticism.

THA 480 Directing II (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 (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 (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: Eighteenth and Nineteenth Centuries (3)

An examination of the social, cultural and economic influences on the American drama and theatre. Trends in theatrical production and dramatic types, Revolutionary Drama, Social Comedy, Romantic verse Drama, ethnic characters, and Naturalism.

THA 487 American Theatre: Twentieth Century (3)

A continuation of THA 486, with emphasis placed upon the aesthetic and literary development of the theatre in this century. The New Stagecraft, Agitprop Theatre, Federal Theatre, Anti-war drama, the Absurdist and the avant-garde theatres will be dealt with in detail.

THA 488 Creative Dramatics and Children's Theatre (3)

An introduction to the aesthetical and psychological bases of theatre production for and by young people. The production of children's theatre, play selection, scenery, costumes, management, and touring.

THA 489 Studies in Oral Interpretation (3)

PR: THA 230. Individual oral reading projects; an intensive study of the literature for interpretation.

THA 496 Special Topics (2-5)

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

THA 498 Independent Study (2-5)

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

TRANSPORTATION**TRAN 301 Principles of Transportation (5)**

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

TRAN 401 Transportation Pricing and Policy (3)

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

TRAN 411 Transportation Planning (3)

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 (2-5)

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

ZOOLOGY**ZOOL 100 General Zoology (3)**

PR: BIOL 100. Introduction to zoology; structure, function, representative groups; current concepts in zoological sciences.

ZOOL 101 General Zoology Laboratory (1)

Laboratory exercises illustrating basic principles in zoology; taken concurrently with ZOOL 100.

ZOOL 220,221 Comparative Vertebrate Anatomy (3,3)

PR: ZOOL 100. The vertebrate animals; relationship of organs and systems; and their phylogenetic significance.

ZOOL 234 Anatomy and Physiology (5)

PR: ZOOL 100. The structure and function of the human body.

ZOOL 240 Invertebrate Zoology (5)

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

*May not be offered before 1971.

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ZOOL 310 Histological Technique (4)

PR: ZOOL 100 or consent of instructor. Preparation of tissues for microscopic study; paraffin and cryostat methods; use of microtome; staining procedures; whole mounts.

ZOOL 320 Comparative Vertebrate Embryology (5)

PR: ZOOL 100 and preferably ZOOL 220-221. Embryology of the vertebrates; fertilization of egg; stages of cleavage; development of organs and systems.

ZOOL 322 Vertebrate Histology (4)

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

ZOOL 330 Animal Physiology (5)

PR: ZOOL 100 and junior standing. Function and interrelationships of nervous, endocrine, muscle, reticulo-endothelial, reproductive, excretory, respiratory, and digestive systems; immunology, serology.

ZOOL 340 Taxonomy of the Vertebrates (4)

PR: ZOOL 100. A survey of the common elements of the vertebrate fauna suitable for non-biologists and potential teachers.

ZOOL 345 General Entomology (4)

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

ZOOL 350 Animal Ecology (4)

PR: ZOOL 100 and 11 hours in the biological sciences. Effects of environmental factors on various vertebrate and invertebrate groups.

ZOOL 355 Game Conservation and Management (3)

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

ZOOL 370 Animal Parasitology (5)

PR: ZOOL 100. Identification and life histories of representative parasitic protozoa and helminths emphasizing host-parasite relationships; techniques of animal examination; emphasis on human parasites.

ZOOL 400,401 Advanced Animal Biology (2,2)

PR: ZOOL 100 and junior standing. Selected topics in animal biology; modern zoological theory and principles; recent research.

ZOOL 496 Special Topics (2-5)

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

ZOOL 497 Undergraduate Seminar (2-5)

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

ZOOL 498 Independent Study (2-5)

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

ZOOL 499 Undergraduate Research (2-5)

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

EDPE 321 Exercise Physiology - Cardiovascular (5)

PR: ZOOL 234. A circulatory study of man's homeostatic regulation during environmental stress. (Includes lecture and laboratory).

JRN 422 Public Affairs Reporting (3)

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