

forms of chromatography for the separations of biomolecules, especially proteins, will be introduced. Some emphasis will be placed on preparative and large scale applications. 3 lec.

483 Biomedical Engineering (3)

Prereq: jr/sr in engineering, chem, physics, biol. Biomedical engineering with an emphasis on cell and tissue engineering.

492 Special Investigations (1–3, max 9)

Prereq: perm. Individual or small-group work, under staff guidance, in research or advanced study in particular field of chemical engineering. (Only three hours of special investigations in any area can be counted towards the CHE technical elective requirement.)

493 Intercollegiate Design Competition (1-3, max 9)

Individual or small group participation, under faculty guidance, in regional or national student design competition. (A maximum of three credit hours may be applied toward the CHE technical elective requirement.)

499 Chemical Engineering Senior Assessment (1)

Prereq: 443. Assessment of skills, behaviors, and attitudes of students graduating in chemical engineering. Examination of retention from prerequisite courses. Readings and discussion of professional and ethical responsibility, the impact of engineering solutions in a global and societal context, the need for lifelong learning, and knowledge of contemporary issues. 2 rec.

Engineering, Civil (CE)

200 Civil Engineering Fundamentals (1)

(spring) Overview of civil engineering profession and specialization areas, value of professional organizations and lifelong learning, introduction to departmental facilities, description of curriculum, and advising responsibilities. 1 lec.

201 Civil Engineering Computational Techniques (3)

Prereq: MATH 263A or concurrent. (spring) Introduction to methods of problem solving, use of computers for calculations, applications or problem solving to civil engineering. 3 lec.

210 Plane Surveying (4)

Prereq: MATH 163 or MATH 263A, or perm. (fall, spring) Basic theory and field practice in measurement of distance, elevation, and angle; introduction to GPS and photogrammetry. 3 lec, 3 lab.

220 Statics (4)

Prereq: MATH 263C, PHYS 251. (fall, winter, spring) Laws of equilibrium of forces, friction, centroids, and moment of inertia. 4 lec.

222 Strength of Materials (4)

Prereq: grade of C or better in 220. (fall, winter, spring) Simple stresses and strains, bending, torsion, beam deflection, columns, and combined stresses. 4 lec.

223 Strength of Materials Laboratory (1)

Prereq: 222 or with 222. (fall, winter, spring) Testing of various materials under axial compression, tension, flexure, torsion, impact, fatigue. Use of electrical, mechanical, and photoelastic strain measuring equipment. 2 lab.

311 Route Engineering (3)

Prereq: 210. (winter) Horizontal and vertical curves; geometric design of highways; earth-work distribution. 3 lec.

316 Construction Engineering and Management (3)

Prereq: Jr, (fall). Overview of construction engineering and management, project funding, bidding and selection process, design and construction interface, competitive and negotiated contracts, planning and scheduling, estimation, equipment productivity and safety. 3 lec.

330 Structural Theory I (5)

Prereq: 201; C or better in 222. (fall) Determinacy requirements; analysis of statically determinate structures; influence lines; deflections; introduction to analysis of statically indeterminate structures. 5 lec.

331 Structural Theory II (3)

Prereq: C or better in 330. (winter) Indeterminacy conditions for structures; slope deflection meth-

od; moment distribution method; influence lines; introduction to computer methods. 3 lec.

340 Fluid Mechanics (4)

Prereq: C or better in ME 224. (fall, winter, spring) Statics and dynamics of viscous and nonviscous fluids, dimensional analysis and similitude, pipe flow, principles of lift and drag, introduction to boundary layers. 4 lec.

341 Fluid Mechanics Laboratory (1)

Prereq: 340 or with 340. (fall, winter, spring) Lab techniques, calibration principles, fluid and flow measurements. 2 lab.

342 Applied Hydraulics (3)

Prereq: C or better in 340. (spring) Flow and pressure distribution in multiloop networks, dynamics of flow in pumps and turbines, uniform and nonuniform flow in open channels, culvert hydraulics, hydraulic transients. 3 lec.

343 Hydrology (3)

Prereq: 340, ISE 304 or with ISE 304. (spring) Hydrologic cycle. Precipitation and runoff data; groundwater hydraulics; infiltration; peak runoff calculations. Application to water resource problems. 3 lec.

353 Basics of Environmental Engineering (3)

Prereq: jr. (spring) Engineering concepts, theory, design, and practice as applied to solution of problems of environmental technologies, waste management, drainage, and control of water, soil, and atmospheric pollution; social and environmental impact of these solutions. 3 lec.

361 Transportation Engineering (3)

Prereq: 311. (spring) Introduction to Transportation Engineering with emphasis on transportation planning concepts and multi-modal design elements. 3 lec.

370 Geotechnical Engineering (4)

Prereq: 222, 340, GEOL 283, or concurrent with 340. (winter) Soil compositions, physical and chemical properties, and classifications; water movement and seepage problems; consolidation and shear strength; applications to earth structures, retaining walls, slope stability, bearing capacity, and settlement. May be taken as 570 for grad credit except by civil engineers. 4 lec.

371 Soil Engineering Laboratory (1)

Prereq: 370 or concurrent with 370. (winter) Classification of soils and determination of their properties through tests; grain size analysis, Atterberg limits, relative density, Proctor testing, permeability, direct shear, and consolidation. 2 lab.

380 Civil Engineering Materials (3)

Prereq: 222. (spring) Engineering properties of materials used in civil engineering applications including metals, concrete, timber, and composites. 3 lec.

400 Societal Concerns in Civil Engineering (2)

Prereq: senior. (fall) Engineering economy, codes, variances, alternative designs, and public meetings. 2 lec.

410 Applied Property Surveying (3)

Prereq: 210. (spring) Triangulation, astronomical observations, land surveying, instrument adjustments, special topics. 2 lec, 3 lab.

415 Geodetic Surveying (3)

Prereq: 210 or perm. (winter) Astronomical observations and methods used in GPS and photogrammetry to establish horizontal and vertical control for objects. 3 lec.

416 Construction Estimating (3)

Prereq: 316. (winter). Methods used to elaborate construction estimates, to prepare and understand the components of a bid, and conduct manual and computer-aided take-off and pricing. 3 lec.

417 Construction Planning and Scheduling (3)

Prereq: 316. (spring). Techniques and applications of all aspects of the construction scheduling process, including background on scheduling construction projects, development of work breakdown structures, and transition to elements of the construction project schedule, linear scheduling methods for heavy construction, use of real-world examples in civil engineering and applications using Primavera Project Planner. 3 lec.

418 Construction Administration (3)

Prereq: 316. (winter). Aspects of construction administration, including project funding,

contractor cash disbursements, contract provisions, construction economics, borrowing practices, concepts and explanations of financial documents and cost reports, overview of book-keeping fundamentals and construction marketing practices. 3 lec.

423 Continuum Mechanics (4)

Prereq: perm. (demand) Matrix methods in mechanics and structures; laws of dynamics; mechanical properties of solids and fluids; basic theories of continuum mechanics. Grad course open to selected undergrads. 4 lec.

424 Strength of Materials II (3)

Prereq: C or better in 222. (fall) Unsymmetrical bending, shear centers, columns, energy, and continuation of basic topics usually taught in Strength of Materials I. 3 lec.

431 Experimental Methods in Structural Dynamics (3)

Prereq: perm. Modal analysis of structural models to identify their vibration characteristics. Frequency response functions using dual-channel signal analyzers. Mobility measurement techniques. Modal parameter extraction techniques. Computer-aided structural dynamics. Grad course open to selected undergrads. 2 lec, 3 lab.

432 Structural Design in Concrete (4)

Prereq: C or better in 330. (winter) Materials and properties; design methods, strength of rectangular sections subject to bending moments, axial loads, and shear forces either separately or in combination; continuity in concrete construction; design of one-way slabs; design of T-sections in bending; deflection calculations; footing design. 4 lec.

433 Structural Design in Steel (4)

Prereq: C or better in 330. (spring) Materials and properties; design methods, design of tension members; structural fasteners; design of compression members, beams, trusses, and frames. 4 lec.

434 Advanced Structural Design (3)

Prereq: 432 or 433, or perm. (fall) Design of complete structures or major components of structures. 3 lec.

437 Timber Design (3)

Prereq: 330. (winter) Material properties and behavior of structural timber. Analysis and design of sawed timber and laminated timber members. Timber construction analysis and design. 3 lec.

438 Prestressed Concrete Design (3)

Prereq: 330, 432. (spring) Theory of prestressing. Design and analysis of prestressed concrete beams, slabs, box girders, and bridge girders by elastic and ultimate strength methods. 3 lec.

439 Computer-Aided Structural Design (3)

Prereq: 432 and 433, or perm. (fall) Analysis and design of complete structural systems constructed from reinforced concrete, structural steel, and/or other applicable materials by using computers. Material reports and cost estimation of projects. 1 lec, 4 lab.

445 Flow Routing (3)

Prereq: 342 or perm. (demand) Gradually varied flow computation, the use of computer software programs for flow routing, and their engineering applications. 3 lec.

450 Water Treatment (3)

Prereq: 342, 343, CHEM 123. (fall) Sources and collection of public water supplies; principles of treatment processes. 3 lec.

451 Wastewater Treatment (3)

Prereq: 342, 343, CHEM 123. (winter) Quantities and collection of municipal wastewater; principles of treatment processes. 3 lec.

452 Water and Wastewater Analysis (3)

Prereq: CHEM 123. (fall) Lab methods and interpretation of results for chemical and bacteriological examination of water and wastewater. 2 lec, 3 lab.

453 Solid/Hazardous Waste Management (3)

Prereq: CHEM 123 or 153 and sr. (fall) Application of engineering principles to chemical processing systems to reduce or eliminate discharges which have a negative impact on environmental systems; investigations into green building practices and sustainability including use of novel or recycled materials, energy management and efficiency, water use/re-use, and indoor air quality. 3 lec.

454 Green Engineering (3)

Prereq: sr, perm. (winter) Identification, classification, and study of methods of characterization, handling, treating, managing, and disposal of solid/hazardous wastes regulated under federal and state guidelines and legislation. 3 lec.

457 Water Resources Engineering (3)

Prereq: 343 or perm. (fall) Elective sr civil engineering course designed to provide integrated treatment of water resources engineering, including hydrological measurements, runoff, groundwater, water law, reservoir design, frequency analysis, planning, flood control. Systems approach to multi-purpose water resource projects emphasized. 3 lec.

458 Water Quality Engineering (3)

Prereq: perm. (winter) Natural and man-made characteristics of water quality, changes in quality resulting from use, criteria for control of stream pollution, methods of improving water quality, also legal, economic, and institutional aspects. Grad course open to selected undergrads. 3 lec.

462 Traffic Engineering (3)

Prereq: 361; major or perm. (winter) Traffic parameters, traffic data collection, capacity analysis of freeways, signalized intersection design. 3 lec.

471 Foundation Engineering (3)

Prereq: 370. (fall) Design and construction problems in soil engineering; subsurface investigation; foundation selection and design criteria; principles of design of shallow and deep foundations; site improvement. 3 lec.

474 Soil Mechanics Laboratory (1)

Prereq: perm. (spring) Advanced techniques for measurement of soil engineering properties. Grad course open to selected undergrads. 3 lab.

476 Soil Stabilization (4)

Prereq: perm (spring) Engineering, geological, and pedological soil classification systems. Mineralogy of clay minerals and claywater systems; requirements for and factors affecting soil stability. Methods and mechanics of soil stabilization; designing and testing stabilized soils. 3 lec., 3 lab.

482 Paving Materials and Mixtures (3)

Prereq: perm. (fall) Types, constituents, chemical behavior, tests, specifications, and uses of bituminous materials, Portland cements, and aggregates in pavements. Design and manufacture of paving mixtures and construction of pavements. Grad course open to selected undergrads. 2 lec, 3 lab.

483 Principles of Pavement Design (3)

Prereq: perm. (spring) Fundamentals of wheel loads and stresses in pavements. Properties in pavement components and design tests. Design methods and evaluations. 3 lec.

490 Special Investigations (1-5)

Prereq: perm. Special investigation or problems not covered by formal courses. Permits well-qualified student to pursue individual study under direction of faculty member.

491A Senior Design—Land Development (4)

Prereq: 343, 361, or perm. (fall) An advanced applied engineering course utilizing multiple fundamental civil engineering courses as applied to land development. *CE 491A is a Tier III equivalent course.*

491B Senior Design—Environmental/Water Resources (4)

Prereq: 450, with 451. or perm. (winter) An advanced applied engineering course utilizing combinations of water/wastewater treatment and hydraulics/hydrology courses as applied to society's needs. *CE 491B is a Tier III equivalent course.*

491C Senior Design—Structures and Foundations (4)

Prereq: 370 and 432 or 433, or perm. (spring) A civil engineering design elective integrating fundamental civil engineering courses for foundation and structural design, analysis, and drawing. *CE 491C is a Tier III equivalent course.*

491D Senior Design—Special Project (4)

Prereq: sr and perm. An advanced applied engineering course integrating several major disciplines of civil engineering in a design project. *CE 491D is a Tier III equivalent course.*

499 CE Undergraduate Research Experience (3)

Prereq: perm. (fall, winter, spring) Students participate in an independent and original laboratory research project under the close

supervision of a faculty advisor. This entails familiarization with relevant civil engineering literature, laboratory work, preparation of a report, and presentation of a departmental seminar.

Engineering, Electrical (EE)**101 Introduction to Electrical Engineering (4) (2A)**

Prereq: MATH 113 or placement level 2. (fall, winter) The goal of this course is to introduce students to the profession of electrical engineering. Students will develop a knowledge of key technical concepts of electricity: voltage, current, resistance, and power. In addition, students will study the history, professional values, and methods of electrical engineering. Lab work provides hands-on experience with electrical systems. 3 lec, 2 lab.

102 Introduction to Computer Engineering (4)

Prereq: MATH 113 or placement level 2. (fall, winter) The goal of this course is to introduce students to the field of computer engineering. Students will develop a knowledge of the fundamentals of Boolean algebra, binary arithmetic, characteristics of logic gates, and flip-flops. Lab work provides hands-on experience with digital systems. 3 lec, 2 lab.

103 Introduction to Electrical and Computer Engineering Design (4)

Prereq: EE 101, 102, and CS 210, or 230, or 240A, or ET 181. (fall, spring) The goal of this course is to introduce students to design in electrical engineering. Students will develop an understanding of engineering design principles. Students will also develop a knowledge of microcomputer organization and an ability to perform assembly language programming. Lab work provides students an opportunity to apply design principles on a major project. 3 lec, 2 lab.

210 Foundations of Electrical and Computer Engineering I (4)

Prereq: 101 and MATH 263A. (fall, winter) Basic concepts and definitions, units, DC circuit analysis, Kirchhoff's laws, source transformations, nodal and mesh analysis, network theorems, inductance and capacitance, and simple RC and RL circuits with an emphasis on developing problem-solving skills. Students will be expected to have, and be able to demonstrate, a firm "understanding" of these topics as well as a mastery of basic problem-solving skills. In addition, there will be an emphasis on being able to make an effective technical presentation.

211 Foundations of Electrical and Computer Engineering II (4)

Prereq: C or better in 210 and MATH 263B. (winter, spring) Continuation of 210. RC and RL circuits, Laplace Transforms, State-Variables, Fourier Analysis, AC circuit analysis, and the frequency domain, with an emphasis on strengthening problem-solving skills. Students will be expected to have, and to demonstrate, a thorough understanding of the frequency domain and how DC circuits, transient circuits, Fourier circuits, and AC circuits can be represented in the s-domain. They will also need to demonstrate a mastery of advanced problem-solving skills. In addition, students will need to effectively communicate, in written form, advanced technical concepts and problems.

212 Foundations of Electrical and Computer Engineering III (4)

Prereq: 103, 211, 221. (fall, spring) Advanced AC circuits, polyphase circuits, magnetically coupled circuits, frequency response and filters, two-port circuits, and simple electronic circuits. Students will need to have, and demonstrate, a thorough understanding of the basic fundamentals of electrical and computer engineering and how they relate to more advanced subjects, such as those covered in this course. They will also need to demonstrate a facility with advanced problem-solving techniques. There will be a design project to be performed in the laboratory. 3 lec, 2 lab.

221 Instrumentation Laboratory (4)

Prereq: 210, with 211. (winter, spring) Designed to give students a proficiency in using electrical instruments. Emphasis will be on learning how to use instruments, using good experimental technique, and knowing the limitations of various laboratory equipment. Emphasis will also be placed on the proper acquisition, recording, analysis, and

reporting of data. Format will include classroom instruction and laboratory work. 2 lec, 4 lab.

224 Introduction to Digital Circuits and Computer Design (4)

Prereq: 103, 211. (spring, fall) Microprocessor components, information representation, analysis and synthesis of combinational and sequential circuits, datapaths, pipelining, control units, instruction sequencing and interpretations, instruction set architectures and FPGAs.

304 Basic Electrical Laboratory I (1)

Prereq: 313 or with 313. Lab supplement to 313. Basic instruments and circuit measurements. Not open for credit to electrical engineering majors.

305 Basic Electrical Laboratory II (1)

Prereq: 304 and/or with 314. Lab supplement to 314. Operation of semiconductor devices, amplifier design, oscillators and digital circuits design. Not open for credit to electrical engineering majors.

313 Basic Electrical Engineering I (3)

Prereq: MATH 263B, PHYS 253. (fall, winter) DC circuits, single-phase steady state AC circuits, and the frequency and transient responses of energy-storage networks. Not open for credit to electrical engineering majors.

314 Basic Electrical Engineering II (3)

Prereq: 313. (winter) Semiconductor devices, small signal analysis, amplifiers and oscillator circuits, pulse and digital circuits. Not open for credit to electrical engineering majors.

315 Basic Electrical Engineering III (3)

Prereq: 313. (spring) Transformers, direct current machines, polyphase induction and synchronous, rotating machines, including equivalent circuits and steady state performance prediction. Not open for credit to electrical engineering majors.

321 Electromagnetics and Materials I (4)

Prereq: 212, MATH 440. (winter, spring) Designed to develop in students an understanding of Maxwell's equations through an overview of properties of materials, electrostatics, magnetostatics and electrostatics, and magnetostatics and electrodynamics.

322 Electromagnetics and Materials II (5)

Prereq: 321. (fall) Continuation of 321. Discussion of time-varying, electromagnetic fields. Application of field theory to solution of problems from various branches of electrical engineering with emphasis upon physical interpretation. Included are relation of field theory to circuit theory, Poynting's theorem, stored energy and power flow, complex fields and power, TEM waves, uniform plane wave, wave reflection and refraction. Theory and applications of transmission lines.

333 Intermediate Electrical Engineering I (4)

Prereq: 211. (fall, winter) Develop an understanding of the relationship between signals and systems. Includes a continuation of the Laplace and Fourier analysis started in EE 211 and modeling of high-order electrical and mechanical systems. Frequency response, Bode plots, and systems design using poles and zeros will be addressed, as well as state equations representation and analysis. Students will also develop an awareness of discrete time systems, difference equations, Z transforms, sampling, and digital filters.

334 Intermediate Electrical Engineering II (4)

Prereq: 395B (fall, spring) Develop an understanding of electronic devices including diodes, bipolar transistors, and FETs. Students will also develop an awareness of semiconductor properties and operations, and use this knowledge to design analog circuits. Course includes computer-aided analysis and design.

335 Energy Conversion (5)

Prereq: 321. (fall) Basic principles of electromechanical energy conversion. Circuit models and parameter tests for single-phase and 3-phase transformers. Fundamentals of DC machinery; circuit models and characteristics of DC motors. Fundamentals of AC machinery; theory and operation of synchronous machines and induction motors.

351 Intermediate Computer Engineering I (4)

Prereq: 224. (fall, winter) Fundamental knowledge and skills for the study and practice of computer engineering. Utilize assembly language loops, tables, lists, and interrupts as well as microprocessor I/O with the PIC microprocessor.

Discrete-time signals and systems including convolution, Z-transforms and frequency response.

352 Intermediate Computer Engineering II (4)

Prereq: 351, 371. (winter, spring) Theoretical framework for information processing technology concentration, and transmitting discrete and continuous-time signals and data by digital systems and computers. A continuation of EE 351.

371 Applied Probability and Statistics for Electrical Engineers (4)

Prereq: 212, or MATH 263D with CS 361. (fall, spring). Fundamentals of statistics and probability and the ability to apply them to problems in electrical engineering.

395A Intermediate Electrical and Computer Engineering Design Experience (4)

Prereq: 102 and CS 240A and junior standing. Enhancement of the laboratory skills of students and to reinforce an understanding of the fundamentals necessary for the execution of successful experimentation. Students will develop a greater awareness of specific topics in electronics, systems, energy conversion devices, power distribution, communications, and electromagnetics. 2 lec, 4 lab.

395B Intermediate Electrical and Computer Engineering Design Experience (4)

Prereq: 395A. Continuation of EE 395A. 1 lec, 6 lab.

395C Intermediate Electrical and Computer Engineering Design Experience (4)

Prereq: 395B. Continuation of EE 395B. 8 lab.

401 Advanced Laboratory I (1)

Prereq: perm. (fall, winter, spring) Advanced lab format follows that of intermediate lab. Student-proposed projects are design- or research-oriented and directed by faculty member specializing in area of investigation. Portion of this lab required in conjunction with certain electrical engineering 400-level lecture courses.

402 Advanced Laboratory II (1)

Prereq: perm. (fall, winter, spring) See 401 for description.

403 Library Research (1)

Prereq: perm. (fall, winter, spring) Library research under the supervision of a faculty member. Prior approval required. See departmental office for regulations.

405 Physical Electronics (3)

Prereq: 334. (fall) Simplified 1-dimensional band theory of solids. Valence and conduction band occupancy from Fermi-Dirac statistics. Hole conduction and doping. Derivation of PN junction volt-amp-temperature characteristic. DC and AC characteristics of junction transistors derived from fundamentals.

406 Advanced Analog Circuits (3)

Prereq: 334. (spring, on demand) Advanced analog circuitry. Operational amplifiers, characteristics, limitations. Linear and nonlinear applications. Feedback, stability criteria, compensation, time, and frequency response. Waveform generation and shaping, timing, comparison, and arithmetic operations.

407 Advanced Digital Circuits (3)

Prereq: 334. (winter) Advanced digital circuitry. Basic logic operations, digital device families, and characteristics. Arithmetic, counting, memory, other MSI and LSI functions. Numeric display devices. Analog/digital conversion.

410 Semiconductor Principles I (3)

Prereq: 405. (spring, on demand) Continuation of 405. Application of semiconductor theory to solid state devices: diodes, transistors, FETs and Gunn effect devices. Charge control analysis; Ebers-Moll equations; electro-optical effects.

414 VHDL Design (4)

Prereq: 102 (fall) Application of very high speed hardware description languages (VHDL) for digital design, simulation, verification, and specification. Structural design concepts, design tools. VHDL language, data types, objects, operators, control statements, concurrent statements, functions, and procedures. VHDL modeling techniques, algorithmic, RTL, and gate level designs. Design synthesis. 3 lec, 2 lab.

415 VLSI Design (3)

Prereq: 334. (winter) Introduction to very large scale integration (VLSI) technology and design of CMOS integrated circuits. VLSI fabrication process, design rules, logic design, performance estimation, chip engineering, and computer aids to VLSI design. Students may register for 2 hours of senior lab (401, 402) credit for the VLSI lab work. 3 lec, 2 lab.

416 VLSI Design II (4)

Prereq: 415. Sequential system design, clock generation and clocking disciplines, design validation, sequential testing, standard cell layout, adders, ALUs, multipliers, high-density memory, PLA design, floorplanning, O/I architecture, register transfer design, data-path control, high-level synthesis. 3 lec, 2 lab.

425 Control Theory I (3)

Prereq: 333. (winter) Formulation of models for lumped parameter systems, fundamental principles of closed loop control, signal flow graphs, stability, Routh-Hurwitz criterion, root locus construction, specifications, and design via root locus.

426 Control Theory II (3)

Prereq: 425. (spring) Simulation, Bode plots, frequency response performance specifications and relationship to time domain specifications, Nyquist criterion, relative stability measures, closed loop frequency response, analytical design of lead, lag, lag-lead, and PID compensators.

427 Control Theory III (3)

Prereq: 426. Sampling and data reconstruction, discrete-time systems, z-transforms, sampled data systems, frequency response, Nyquist criterion, root locus, bilinear transformation, analytical design of lead, lag, lag-lead, and PID compensators.

428 State Variable Methods in Control (3)

Prereq: 425. (fall, on demand). Basic state variable concepts, writing state equations, time-domain solution of the state equation and the matrix exponential, relations to transfer functions, controllability and observability, stability, state variable methods of design including state feedback and state estimation.

429 Mechanics and Control of Robotic Manipulators (4)

Prereq: sr. (spring) Classification and applications for mechanical manipulator systems. Manipulator motion description, forward kinematics transformations, and solution of inverse kinematics equations. Velocity kinematics and manipulator dynamics equations. Trajectory generation and control schemes including sensory feedback. Lab exercises to augment lecture material. Co-listed with ME 429.

431 Optoelectronics and Photonics I (3)

Prereq: 321. (fall) Introduction to important modern optical devices and lasers and their applications. Emphasizes basic physical theory needed to understand lasers, their construction, and their applications. Detailed discussion of various types of lasers and their characterization.

432 Optoelectronics and Photonics II (3)

Prereq: 431. (winter) Continuation of 431. Additional theoretical material discussed beginning with Maxwell's equations. Examines electromagnetic issues that play major role in laser oscillations—amplification and feedback. Characterization of lasers and continuing discussion of laser types and their applications.

433 Optoelectronic Materials and Devices (3)

Prereq: 405. Introduction to modern optical materials and devices utilizing semiconductor technology; optical integration of these devices and their application in diverse fields. Fundamentals of devices and materials emphasized.

440 Microwave Theory and Devices (3)

Prereq: 322. (Offered spring every other year.) Wave propagation, transmission lines, Smith chart, impedance matching, waveguides, and survey of devices (microwave generators, semiconductor devices, etc.)

441 Antennas (3)

Prereq: 395C. (winter) Fundamental concepts and definitions, radiation integrals and potential functions, linear wire antennas, loops, arrays, and personal computer applications.

443 Electromagnetics I (3)

Prereq: 322. (Offered winter every other year.) Mathematical review of vector operations in

Cartesian and curvilinear coordinates. Solution of wave equation in Cartesian coordinates and application to wave reflection from interfaces between general media. Decomposition of wave solutions into TE, TM, and TEM waves, with application to waveguides and transmission lines; solution of wave equation in cylindrical coordinates, with application to circular waveguide, radiation from line sources, and scattering from cylindrical objects.

454 Power Electronics (3)

Prereq: 334. (winter) Introduces seniors to power electronics. Covers most uses of semiconductor devices for the conversion and control of electric power: AC to DC, AC to AC, DC to DC, DC to AC conversions, and DC and AC motor drives. Semiconductor device characteristics (particularly those characteristics not stressed in 340 and 341) and device protection conclude the offering.

455 Introduction to Electric Power System Engineering and Analysis I (3)

Prereq: 335. (fall) Includes power system representation, computer methods, symmetrical components, protection methods, and stability.

456 Introduction to Electric Power System Engineering and Analysis II (3)

Prereq: 455. (winter) Continuation of 455. See 455 for description.

457 Introduction to Electric Power System Engineering and Analysis III (3)

Prereq: 456. (spring) Continuation of 455, 456. See 455 for description.

461 Digital Systems I (3)

Prereq: 352. (winter) Postulates and fundamental theorems of Boolean algebra; algebraic and map methods for design of combinational logic and simple sequential circuits; logic minimization methods; introduction to system design using shift registers, counters, etc.

462 Digital Systems II (3)

Prereq: 461. (spring) Basic concepts from theory of finite-state machines, analysis and synthesis of sequential circuits, study of state assignment, synchronous and asynchronous machines, and system design using integrated circuits.

463 Digital Systems III (3)

Prereq: 462. (spring) Synthesis of sequential circuits using ROMs and RAMs for control logic. Introduction to computer organization and design including selection of instruction set, register and bus organization and implementation of control logic with microprogrammed control.

467 Advanced Microprocessors (3)

Prereq: 395A. (winter or spring) Organization of 16- and 32-bit microprocessors. Particular attention given to a specific microprocessor family (such as the Motorola 680XY) regarding instruction set, assembly language programming, arithmetic operations, I/O, etc.

468 Microcomputers II (3)

Prereq: 395A. (winter or spring) Design, implementation, and application of microcontroller or microprocessor based systems. Microcontroller instruction set architectures (e.g. PIC Micro). Fault-tolerant systems. Other topics include but are not limited to hardware interface to external components, serial and parallel input/output (I/O), networks of microcontrollers and embedded microprocessors (e.g. CAN, I2C, TTP, SPI, Ethernet), motor and actuator control. Computer projects emphasize the design and implementation microcontroller-based systems.

470 Communication Engineering (3)

Prereq: 333. (fall) Unified approach to communications stressing principles common to all transmission systems. Review of Fourier series. Fourier integral and complex frequency techniques with emphasis on communication networks, time response and convolution, measurement of information, amplitude modulation (double and single side-band techniques), frequency modulation, sampling theory, pulse modulation and digital communications systems, fundamentals of random signal theory and its application to communication systems, noise and its effect on conventional modulation systems; noise figure, noise suppression techniques, and other related topics.

471 Stochastic Processes in Electrical Engineering (3)

Prereq: 371. (winter) Brief review of probability concepts, including densities, moments, etc.

Random process fundamentals (ensembles and realizations), stationarity concepts, 2nd-order statistics, Gaussian processes, random signal through linear systems, Markov chains.

472 Introduction to Digital Communications (3)

Prereq: 470, 471. (spring) Summary review of deterministic and stochastic signal and system characterizations, sampling quantization. Baseband pulse signaling and the matched filter. Introduction to signal spaces and distance concepts. Bandpass modulations and their performance in AWGN. Link budget analysis, synchronization overview.

478 Introduction to Digital Signal Processing (3)

Prereq: 333, 371. (on demand) Discrete time signals and systems review, convolution, discrete-time Fourier transform, z-transform, canonical filter representations, windowing, and FFT.

481 Professional Experience in Electrical Engineering (1)

Prereq: sr and perm. Supervised work-study program in an electrical engineering profession, in established industrial environment. Credit dependent on advance registration and mutual agreement between faculty supervisor and participating company. May be repeated; however, hours applied toward graduation limited by department.

485 Electronic Navigation Systems I (3)

Prereq: 321, 333. (winter) Principles and theory of operation of electronic navigation systems with emphasis on avionics; aircraft instrumentation, VOR, DME, Inertial, Omega, LORAN, ILS, MLS, Transit, GPS, air traffic control, and radar.

486 Electronic Navigation Systems II (3)

Prereq: 485. (spring) Continuation of 485. Focused on current and future avionics systems and aircraft electronics. Design and signal processing in navigation receivers.

487 Electronic Navigation Systems III (3)

Prereq: 486. Continuation of 485 and 486 with emphasis on mathematical modeling of navigation and landing systems, fault tolerant avionics system design and architectures, and flight testing and current developments.

490 Selected Topics (1-6)

Prereq: perm. Selected topics of current interest in electrical engineering.

495A Electrical and Computer Engineering Capstone Design I (4)

Prereq: 44 hours of EE. The goal of this course is to give students the opportunity to refine and demonstrate their ability in engineering design. Students work on a major design project as part of a team with an emphasis on problem definition and specification. They will conduct a preliminary design review. In addition, students will study the systems approach to problem solving, engineering ethics, economic analysis, and the elements of scheduling and planning. 3 lec, 2 lab.

495B Electrical and Computer Engineering Capstone Design II (4)

Prereq: 495A. Continuation of EE 495A. Students are expected to continue the design begun in EE 495A with an emphasis on construction, pre-testing, and redesign. They will conduct a critical design review. In addition, students will study and develop skills necessary for a successful engineering career. 1 lec, 6 lab.

495C Electrical and Computer Engineering Capstone Design III (4)

Prereq: 495B. Continuation of EE 495B. Students are expected to complete the design developed in EE 495B with an emphasis on final assembly, testing, and analysis of outcomes. They will conduct a formal design review. In addition, the student will be exposed to a variety of career options available to graduates. *This is a Tier III equivalent course.* 1 lec, 6 lab.

Engineering, Industrial and Systems (ISE)

200 Introduction to Computers and Industrial Engineering (4)

(winter, summer) Introduces the major skills that Industrial Engineers are responsible for in practice, including engineering economy, methods of

analysis, and system design. The applications and important features of office software, especially spreadsheets, are explained, with examples related to the IE skills that are discussed.

201 Data Display and Management (4)

Prereq: MATH 263A (winter, summer) How data—primarily numeric—can represent systems. Focuses on the dimensionality of the data and common formats for data in structured problem solving. Course introduces software used for data management and analysis.

304 Applied Engineering Statistics (3)

Prereq: MATH 163B or MATH 263B. (fall, winter) Introduction to efficient methods for data collection and analysis. Application of basic statistical tests, techniques, and experimental design concepts to engineering and science data problem areas. Not for ISE majors.

305 Engineering Statistics I (4)

Prereq: MATH 263C. (winter, spring) Introduction to probability, concept of random variables, discrete and continuous probability distributions, and expectation.

306 Engineering Statistics II (4)

Prereq: 305. Math 211 or concurrent. (fall, spring) Functions of random variables, sampling distributions, estimation theory, hypotheses testing, and statistical prediction.

330 Engineering Economy (3)

(fall, spring) Provides knowledge of the economic consequences of engineering decision processes, and methods for evaluation of engineering design alternatives in terms of costs and benefits. Topics include time equivalence of money, annual cost method, present worth method, rate of return method, depreciation, benefit/cost, break-even analysis, income taxes, equipment replacement and risk.

333 Work Design (5)

Prereq: 200, 305; IT 101. (spring, summer) Design of work systems and measurement of work. Topics include job methods, operation analysis, charting techniques and schematic models, stop-watch time study, work sampling, predetermined time systems, standard data, incentive wage systems, and learning curves. 4 lec, 2 lab.

336 Project Management (3)

(fall) Development and utilization of network techniques, such as PERT and CPM, to schedule activities, develop financial budgets, allocate resources, and control progress and costs of practical projects. Students introduced to use of available computer programs that generate project schedules. 3 lec.

381 Internship in Industrial and Systems Engineering (1-3)

Prereq: jr. Supervised work-study program, in industrial and systems engineering profession, in established industrial or government environment. Credit dependent upon advance registration and mutual agreement between faculty supervisor and participating company. Course may be repeated; however, hours applied for graduation limited by dept.

402 Manufacturing Systems (4)

Prereq: sr in ENT. (winter) Applications of industrial and systems engineering techniques, principles, practices, and methodologies as they relate to the operation, analysis, management, planning, and design of manufacturing systems.

403 Material Handling Systems Engineering (4)

Prereq: 333 or sr in ENT. (winter) Provides a broad understanding of materials handling engineering from a system design and application engineering point of view. Instruction in the engineering principles, design criteria, operating parameters, performance requirements, equipment resources, and applications of engineering practices involved in the planning, design, and operation of materials handling systems for manufacturing, physical distribution, and government operations. A materials handling system design project is a required part of the course.

407 Introduction to Designed Experiments (3)

Prereq: 304 or 306 or equiv. (spring) Design and analysis of engineering experiments approached from linear statistical model point of view. Blocking designs, full and fractional factorial designs, analysis of variance, and introduction to response surface

methodology. Software for statistical analysis is utilized.

412 Principles of Six Sigma (4)

Prereq: 306 (winter) Introduction to the Six Sigma DMAIC problem-solving methodology. Topics covered include the tools and techniques for product and process improvement and the application of basic and advanced statistics to problem solving.

415 Introduction to Systems Engineering (3)

Prereq: 305, MATH 340, ET 181. Introduction to systems engineering concepts. Continuous time and discrete time methods for modeling of systems. Systems structure, open-loop and closed-loop systems, positive and negative feedback. State and transition equations. Applications to modeling in manufacturing, production and inventory systems, service industries, physical and biological systems.

426 Microprocessor Applications in Manufacturing (4)

Prereq: 305, ET 181. Use of microprocessor-based devices in manufacturing. Computer numbering systems, digital logic, data communications, programmable logic controllers.

432 Inventory and Manufacturing Control I (4)

Prereq: 305. (winter, spring) Design of inventory and manufacturing control systems. Forecasting, continuous and period review inventory systems. Relationship between production schedules and inventory. MRP. Production scheduling systems, sequencing models, dispatching rules. 4 lec.

433 Industrial Computer Simulation (4)

Prereq: 306, ET 181. (fall) Simulation of industrial engineering systems using discrete event modeling. Process modeling approach to simulation. Basic (entities, processes, and resources), intermediate (queues, seize, and release), and advanced (entity transport) modeling concepts. Statistical analysis of simulation results. Animation of simulation models. Applications of simulation in manufacturing, production, and service areas. Lab projects using simulation software. 3 lec., 2 lab.

435 Quality Control and Reliability (3)

Prereq: 304 or 306. (winter) Application of statistics to control of quality and reliability in products and services. Design of acceptance sampling and process control systems, including attention to inspection and test methods. Design and implementation of quality assurance programs, including nonstatistical dimension of quality systems. 3 lec.

440 Facility Planning and Design (4)

Prereq: 333, IT 110 or 117 (fall) The process of designing and laying out a facility, with an emphasis on manufacturing facilities. Issues addressed include selecting the type and quantity of production and handling equipment; alternatives for material flow; qualitative and quantitative methods for developing the facility layout; determining the appropriate size for the departments and the facility; and utilizing software as appropriate for determining the facility design.

441 Introduction to Operations Research (4)

Prereq: 305. (fall) Basic methods of operations research. Modeling methods, linear programming, Simplex method, integer programming. Random processes, queueing theory.

442 Inventory and Manufacturing Control II (3)

Prereq: 432. Just-in-time manufacturing, push and pull systems. Performance measurement, classification of manufacturing system performance. Factory dynamics, effect of variability upon production. Variance reduction.

444 Applications of Mathematical Programming (3)

Prereq: 441, MATH 211. Application areas in operations research and the use of software tools for optimization. Theory of the simplex and interior-point methods. Algorithms for linear, mixed integer, and constraint programming. Optimization in industrial and manufacturing systems. Projects using optimization software libraries.

445A Systems Design I (3)

Prereq: 330, 333, 432, ENG 305J. (winter) Design methodology and principles. Identification and definition of design project. *This is a Tier III equivalent course.*

445B Systems Design II (3)

Prereq: 445A. (spring) Individual or small-group system design project continued from 445A. *This is a Tier III equivalent course.*

448 Human-Machine Systems (3)

Prereq: with 407; ET 181, ENG 305J. Role of operator as subsystem in human-machine systems. Design principles for information displays, equipment controls, workplace environments, and life support systems. Design project required. 3 lec.

455 Information Systems Engineering (4)

(winter) Introduction to applications of information systems industry and the design and implementation of these systems. Students will also learn IDEF0 modeling systems and database development.

456 Database Information Systems (4)

Prereq: ISE 200 or ET 181. Introduction to application and development of database systems in industrial engineering. In addition, students will learn IDEF1x modeling and SQL.

489 Special Investigations (1-6)

Prereq: perm. Independent study of a topic in industrial and systems engineering under the guidance of a faculty member.

490 Advanced Problems in Computer Applications (1-6)

Prereq: perm. Special investigations of advanced industrial and systems engineering problems involving use of digital computers.

Engineering, Mechanical (ME)

100 Introduction to Mechanical Engineering (4) (2A)

(fall, winter, spring) Open to students of all majors. Introduction to the history, professional values, and methods of mechanical engineering. Lab work provides hands-on experience with engineering systems and introduces engineering design, graphical, and computer techniques of problem solving. Discussion of current areas of interest for engineering research and future prospects for technology. No specific mathematics background required.

101 Mechanical Engineering-Gateway Course (4)

Gateway course introduces engineering students to the culture and problem solving methods of the mechanical engineering profession. Student teams will work cooperatively with teams of senior ME students on topics of interest to both. Introduction to use of numerical modeling and graphical representation in engineering problem solving. Introduction to professional ethics.

224 Dynamics (4)

Prereq: PHYS 251, C or better in CE 220. (fall, winter, spring) Motion of particles and rigid bodies, work and energy, impulse and momentum. 4 lec.

288 Data Analysis Lab (2)

Prereq: ME101, ET181. An introduction to statistics and a detailed study of its application in the analysis of experimental data. Includes weekly laboratory experiments, and data analysis and curve fitting using computerized methods. Lab experiments and exercises will introduce interpretation of engineering drawings and an introduction to geometric dimensioning and tolerancing (GD&T).

301 Kinematics and Dynamics of Machines (4)

Prereq: C or better in 224. (winter) Analytical and graphical solutions of motion problems involving mechanical elements: linkages, gears, cams, mechanical trains, etc.

303 Machine Design Analysis (4)

Prereq: 301, 314 concurrent. Comprehensive study of the stress and deflection analysis of machine elements. Special emphasis on the design characteristics of materials and on the theories of failure for static, impact and cyclic loads.

304 Machine Elements (4)

Prereq: 303, 351 concurrent. A detailed study of the design and use of machine elements, including screws and fasteners, shafts and associated parts, bearings, gears and other power transmission components. Team design project.

313 Metal Processing (3)

Prereq: CE 222, CHE 331. (winter, spring) Structure of metals, mechanics of metal forming and metal cutting. Analysis of forces, energy requirements, and temperature effects. Interrelationship between metal processing and mechanical properties.

314 Introduction to Manufacturing Processes (4)

Prereq: CE 222, CHE331, 303 concurrent. Introduction to applied statistics in manufacturing. Interrelationship between process, design, materials and mechanical properties. Introduction to major metal manufacturing processes: casting, rolling, forging, extrusion, drawing, machining, powder metallurgy and heat treating. Analysis of forces, energy requirements, and temperatures. Polymers and processing.

321 Introduction to Thermodynamics (4)

Prereq: PHYS 252, MATH 263C. (fall, winter, spring) Basic engineering thermodynamics. Definitions, first law, properties and property relations, second law, availability, and applications to engineering problems.

328 Applied Thermodynamics (4)

Prereq: C or better in 321. (winter) Nonreactive and reactive mixtures, turbomachinery, analytical studies of gas and vapor power cycles, and refrigeration. 4 lec.

350 Introduction to CAD (3)

Prereq: jr/sr, ET 240. (fall, winter) Emphasis upon use of the OU Computer Aided Design/Computer Aided Manufacturing System with the following topics covered: Engineering Design System, Engineering Modeling System, 3-D Graphics, 3-D Visualization, Solid Modeling Concepts, and other topics.

351 Computer-Aided Design I (3)

Prereq: IT101, 304 concurrent. A detailed study of the use of computer-aided design tools in the engineering design process with a focus on solid modeling and finite element analysis. Team design project that emphasizes proper use of CAD tools.

388 Applied Instrumentation Lab (4)

Prereq: ME288 or ISE 304, EE313, CE340 or concurrent. Students will be instructed on the use of basic lab equipment while constructing and testing their own measurement systems. This will comprise the use and construction of various transducers, signal conditioning circuits and data acquisition systems. The importance of error analysis and its application to their own experiments will also be covered. The final part of the course will require the completion of lab experiments using more advanced instrumentation systems.

398 Junior Laboratory (3)

Prereq: EE 304. (fall, winter, spring) Introduction to measurement of various phenomena frequently encountered in mechanical engineering, e.g., strain, temperature, pressure, flow rate, displacement, and acceleration. Emphasis given to interpretation of data and preparation of laboratory reports.

400 Heating, Ventilation, and Air Conditioning (3)

Prereq: jr. (on demand) Description and evaluation of heating, air conditioning, and total-energy systems employed to provide thermal environments for buildings ranging in scope from residences to integrated commercial, apartment, or industrial complexes. Covers human comfort, psychometrics, load analysis, techniques, equipment, and controls.

401 System Analysis and Control (4)

Prereq: MATH 340. (spring) Modeling and formulations of physical systems. Transient and steady-state dynamic responses, and other fundamental theory of automatic controls and applications. 3 lec, 1 lab.

403 Machine Design I (4)

Prereq: CHE 331, C or better in CE 222. (spring) Applications of mechanics, mechanisms, materials, and mechanical processes to design and selection of machine members and units of power transmission.

404 Machine Design II (4)

Prereq: 403. (on demand) Morphology of engineering design. Applications of statistics and probability and techniques of optimization to design. Team design project.

406 Analysis and Design of Mechanisms (4)

Prereq: 301. (on demand) Analysis and synthesis of planar and 3-dimensional mechanisms using classical and modern analytical approaches. Structural synthesis of mechanisms, dimensional synthesis of linkages for function generation, path generation, and for rigid-body guidance. Applications of matrix methods, optimization techniques, and computer solutions.

407 Fundamentals of Nuclear Engineering (4)

(on demand) Nuclear engineering, including nuclear reactions, radiation detection and measurement, reactor criticality, principles of reactor control, radiation shielding, effects of radiation of materials, uses of radioactive materials.

408 Nonlinear Vibrations (3)

(on demand) Qualitative and numerical study of mathematics and physics of nonlinear systems. Formulations of nonlinear engineering problems, solutions techniques, and stability analysis.

409 Advanced Engineering Dynamics (3)

Prereq: 224. (on demand) Theoretical analysis and applications of dynamical aspects and problems of machines and systems.

412 Heat Transfer (4)

Prereq: MATH 340, ET 240, C or better in 321 and CE 340. (spring) Basic concepts of conduction in 1 or more dimensions, steady and transient modes. Radiation, fundamentals of convection in various modes, heat exchanger design. 4 lec.

413 Conduction and Radiation Heat Transfer (4)

Prereq: 412. (on demand) Advanced analytical treatment of conduction and radiation heat transfer. Boundary value problems, orthogonal expansions, moving heat sources, multi-dimensional problems with time varying boundary conditions, finite difference analysis, conformal transformations, radiation network matrix analysis, diffuse-specular exchange, and Monte Carlo techniques, etc.

416 Combustion (3)

Prereq: 328 or 412. (on demand) Introduces student to fundamentals of combustion; enables students to analyze complex combustion processes in constructive manner. Modern diagnostic techniques of combustion, and evaluation of pollution potential of different combustion processes.

417 Design of Thermal Systems (4)

Prereq: 328, 412. (on demand) Design of systems in which thermodynamics, transport behavior, and optimization techniques are major considerations. Emphasis on total design approach including factors such as cost and reliability. Typical systems include power, propulsion, environmental, and cryogenic. Design project and report required.

418 Mechanical Engineering Experimentation (1)

Prereq: ME sr or grad. (on demand) Instruction in experimental procedure and experience in designing and executing lab experiments. Students plan and execute their own experiments to acquire answers to assigned problems. Variety of areas covered including control systems, energy conversion, fluid flow, heat transfer, motion measurements, stress-strain. Instructional guidance provided by entire mechanical engineering staff. Provides familiarity with variety of instrumentation and procedures. Three-quarter sequence with experimental subjects phased with prerequisites.

419 Mechanical Engineering Experimentation (1)

Prereq: ME sr or grad. (on demand) Continuation of 418. See 418 for description.

420 Mechanical Engineering Experimentation (1)

Prereq: ME sr or grad. Continuation of 419. See 418 for description.

422 Stirling Cycle Machine Analysis (3)

Prereq: ET 240, 328, CE 340, with 412. (on demand) Analysis and simulation of Stirling cycle machines, in which the single phase working gas operates in a closed thermal power cycle. Development and use of computer simulation techniques to model the nonsteady flow conditions including thermodynamics, heat transfer, and fluid flow friction effects.

424 Gas Dynamics I (3)

Prereq: CE 340. (on demand) 1- and 2-dimensional compressible flow-isentropic flow, flow with heat transfer, friction, shocks, generalized 1-dimensional flow. Applications to propulsion systems. 3 lec.

425 Propulsion Systems Analysis (4)

Prereq: 424. (on demand) Applications of basic engineering disciplines to design and analysis of vehicle propulsion systems. Extensive use of digital computers. Term report required.

427 Power Station Engineering (3)

Prereq: 328 and 412. (on demand) Fuels, principles of combustion, stationary boilers, grates, stokers, furnaces, coal pulverizers, economizers, preheaters, superheaters, stacks, forced and induced draft, boiler-feed pumps, heat balances, and hydro power. 3 lec.

429 Mechanics and Control of Robotic Manipulators (4)

Prereq: sr. (on demand) Classification and applications for mechanical manipulator systems. Manipulator motion description, forward kinematics transformations, and solution of inverse kinematics equations. Velocity kinematics and manipulator dynamics equations. Trajectory generation and control schemes including sensory feedback. Laboratory exercises to augment lecture material. Co-listed with EE 429.

431 Atmospheric Pollution Control (4)

Prereq: CHE 307, or ME 321 and CE 340, or perm. (on demand) Sources of air pollution from major industries, internal combustion engines, and other sources. Techniques for measuring particulate and gaseous pollutants in atmosphere and at their source. Current techniques and future possibilities for control of air pollution. Bases for air pollution legislation.

434 Fundamentals of Aerosol Behavior (4)

Prereq: 328 or 412. (on demand) Aerosol characterization (transport properties, convective and inertial deposition, light scattering and visibility, experimental methods, coagulation, gas to particle conversion, general dynamic equation for aerosols.

435 Energy Engineering and Management (3)

(on demand) Basic concepts and objectives of energy management, energy audit, engineering evaluation of several energy systems, availability analysis, second law efficiency, economic evaluation, and application of these principles to case studies.

440 Direct Energy Conversion (4)

(on demand) General principles of unconventional energy conversion. Thermoelectricity, thermionics, MHD, fuel cells, photovoltaics, wind systems, solar systems, and energy storage.

446 Potential Flow Theory (3)

Prereq: CE 340. (on demand) Inviscid flow theory. General equations of fluid dynamics, study of potential flow. Grad-level course open to selected undergrads.

447 Viscous Flow Theory (3)

(winter) Mechanics of fluid resistance, laminar and turbulent flow. Applications to external boundary layer flow and to flow in ducts. Grad-level course open to selected undergrads.

450 Computer-Aided Design (3)

Prereq: 350 and 403. (winter) Applications of contemporary computer-modeling techniques to solve complex problems in stress, heat transfer, dynamic systems, and fluid flow. Emphasis given to applications of these techniques to solve specific problems in mechanical-engineering design.

451 Computer-Aided Design II (2)

Prereq: 351, 471 concurrent. A detailed study of the use of computer-aided design tools in the engineering design process with a focus on finite element analysis, dimensioning & tolerancing and drafting. Team design and optimization project that emphasizes proper use of CAD tools.

455 Mechatronics I (4)

Prereq: 224, ET 240, with EE 314. (winter) Principles of design of computer-based, intelligent machines. Microprocessor/microcomputer fundamentals, input-output sensors and actuators, computer achievement of machine kinematics, robot-control techniques, lab experience in microprocessor-machine interfacing.

456 Mechatronics II (3)

Prereq: 301, 401, 403, 455 or equiv, EE 314. (spring) Continuation of 455. Design of intelligent machines with emphasis on design for assembly and design for adaptive tasks. Actuator characteristics and control; kinematics, dynamics, and path control of connected links; special requirements of advanced robotics tasks; optical, acoustical, and tactile sensing and control; end effector and workstation fixtures design.

460 Computer Integrated Manufacturing/Processes (4)

Prereq: 450. (on demand) Introduction to numerical control: control systems for NC; communication media; NC programming languages—SPPL and APT; mathematics for NC; parametric splines, Bezier Curves, and B Splines; sculptured surfaces including Coons bi-cubic patch and B-surf.

461 Design for Manufacture (4)

Prereq: 313, 403. (on demand) Elements of concurrent engineering. Design variables and their influence on manufacture. Effect of manufacturing processes on design decisions. Design for machining, forming, assembly, and inspection.

462 Manufacturing Processes (4)

(on demand) The basic theory of plasticity and its application to manufacturing processes. Applied theories of metal working processes such as forging, extrusion, rolling, and some aspects of machining; theories of polymer processing, composite and reinforced materials processing use of application of materials information systems (MIS), and mapping techniques.

463 Mechanical Behavior and Metallurgy of Materials (4)

Prereq: CHE 331, sr. (on demand) Relationship of mechanical properties to internal structure, i.e., both microstructure and macrostructure. Micromechanical strengthening mechanisms of metals and alloys. Elastic and plastic behavior. Fatigue and fracture behavior and mechanisms. Single crystal deformation and dislocation theory. Ductile and brittle materials testing. Plastic forming of metals. Quantitative microscopy.

470 Mechanical Engineering Design I (4)

Prereq: 328, 403. (fall) This course is the first of a three course sequence that will provide a comprehensive, capstone, senior design experience for mechanical engineering majors. Course includes studies in the analytical techniques of design, as well as the design, construction, and evaluation of the performance of an actual engineering system. ME 470, 471, and 472 must be taken consecutively. 2 lec, 2 lab.

471 Mechanical Engineering Design II (4)

Prereq: 470 (winter) This course is a continuation of ME 470 and must be taken in the quarter following the successful completion of ME 470. 2 lec, 2 lab.

472 Mechanical Engineering Design III (4)

Prereq: 471 (spring) This course is a continuation of ME 471 and must be taken in the quarter following the successful completion of ME 471. This is a Tier III equivalent course. 2 lec, 2 lab.

475 Solar Design (3)

Prereq: jr/sr, MATH 263C, PHYS 253, or equiv. (on demand) Introduction to theoretical principles and practical design aspects of solar energy systems. Topics covered include principles of radiation; heating load computation; air and liquid, flat-plate collectors; concentrating collectors; energy storage; photovoltaic conversion; economic analysis.

476 Automotive Engineering (4)

Prereq: 224, 403. Overview of automotive engineering, including modeling, simulation, design, and testing of land vehicle systems with emphasis on performance, safety, fuel economy, and emissions. Broad exposure to all topics through case studies.

480 Colloquium (1)

Prereq: sr. (on demand) Open presentation of individual engineering analysis or design effort. Requires demonstration of individual analytical or design ability, knowledge of engineering fundamentals (including passing a mini-fundamentals of engineering test), and satisfactory oral presentation techniques.

484 Projects in Thermal Machinery (3)

(on demand) Research in thermal machines. Individual work on experimental or analytical

project involving current problems. Training in use of library, theory and use of instruments, error analysis, planning of experiments, effective report writing. Students should take two-term sequence to allow adequate time for completion of meaningful project. Report required.

485 Projects in Thermal Machinery (3)

Continuation of 484. See 484 for description.

486 Projects in Thermal Machinery (3)

Continuation of 484-485. See 484 for description.

488 Experimental Design Laboratory (2)

Prereq: 388, 471 concurrent. This course is the laboratory testing component of the integrated Senior (Capstone) Design sequence. Design theories will be tested and demonstrated using applied experimental principles and design. The course will be held concurrently with ME 471.

489 Special Investigations (1-6)

Prereq: perm.

491 Mechanical Vibrations I (4)

Prereq: C or better in 224, MATH 340, ET 240, sr. (fall) Characteristic phenomena of mechanical vibrations encountered in machines and structures (of 1 degree of freedom) and their quantitative investigation. Simple harmonic motion; free, transient, and forced vibrations; and damping effects.

492 Mechanical Vibrations II (4)

Prereq: C or better in 491. (spring) Application of matrix methods; 2 degrees of freedom systems; lumped mass systems with several degrees of freedom, and methods for normal mode determination. 4 lec.

493 Lubrication and Bearing Analysis (3)

(on demand) Concepts of boundary, hydrostatic, and hydrodynamic lubrication. McKee, and Boyd and Raimondi methods. Solid lubrication, porous bearings, and gas bearings.

494 Advanced Machine Design (3)

(on demand) Advanced considerations in design and analysis of machine members, strength under combined stress, thermal stress, fatigue in metals, and design using plastics. 3 lec.

495 Introduction to Kinetic Theory and Statistical Thermodynamics (4)

(on demand) Kinetic theory, classical and quantum statistical mechanics with applications to engineering devices. 3 lec.

496 Experimental Methods in Design (3)

Prereq: 403. (on demand) Investigation and evaluation of experimental methods that may be used to obtain design and performance data. Techniques of photo-elasticity, strain measurements, and vibration measurement.

497 Methods of Engineering Analysis I (4)

Prereq: MATH 340. (on demand) Applications of matrices, Fourier series, partial differential equations, and Bessel functions.

498 Senior Laboratory (3)

Prereq: 398, 412, 403 or concurrent. (fall, winter, spring) Mechanical engineering experiments. Measurement of the behavior of more complex systems encountered in mechanical engineering. Equal emphasis given to mechanical systems and to thermal and fluid systems. Engines, vibrating systems, wind-tunnel experiments, refrigeration systems, fatigue, multidimensional stresses, and combustion are typical subjects for investigation.

499 Senior Design Project (4)

Prereq: 404 or 417, and perm. (fall, winter, spring) Capstone design project in mechanical engineering. Self directed or group project which requires typical design activities such as decision making, feasibility evaluation, technical analysis, performance summary, technical report preparation, and oral technical presentation. Projects may be individually arranged with a faculty member in mechanical engineering or a group project (current examples are the Mini Baja Vehicle Contest or the Walking Robot Contest). Subject matter can be mechanisms, thermal/fluid systems, control systems, etc. Oral final presentation to senior class and panel of faculty required.

Engineering and Technology (ET)**106 Engineering Orientation (1)**

Introduction to the Russ College and exploration of the ways engineers and technologists interact with society.

181 Computer Methods in Engineering I (4)

Prereq: MATH 263A or 163A, preference given to ET or pre-engineering majors. Introduction to application of digital computation for solution of engineering problems, with emphasis on methodology and organization. Problem formulation and solution in terms of an object oriented programming approach using the C++ language in an interactive network environment.

190 Cooperative Education Field Experience I (1)

Prereq: perm. Required of, and limited to, students on approved co-op work assignments. Prior approval required before a student registers. Credit earned is not applicable toward specific degree requirements, but will accumulate in the student's academic credit total. In addition to continual monitoring of student's progress by the cooperative education coordinator and the faculty advisor, participating students are required to submit a final report of their activities.

280 Engineering and Technology—Overview (4) (2A)

Intended for students of all majors; non-Engineering Technology students are encouraged. Provides an overview of engineering and technology, to place the profession in a historical context, to examine the views of supporters and detractors, to examine moral and ethical issues associated with the profession in society, and to develop an appreciation for the manner in which engineering and technological work is conducted. Emphasizes a "problem-solving" approach to questions of all kinds, but more specifically to technological ones.

290 Cooperative Education Field Experience II (1)

Prereq: perm. See 190.

320 History of Western Technology (3) (2A)

Survey of significant technological innovations of Western civilization from Greco-Roman period into 20th century. Interrelationships, in history, between technology and society. Background in technology or science not required.

322 Introduction to Materials Behavior (3)

Introductory materials science course covering behavior of metals, polymers, and ceramics for nontechnical majors.

325 Pollution Solutions I (3)

Understanding current air pollution problems, their causes, effects, and possible solutions and impact of those solutions on society.

326 Pollution Solutions II (3)

Same course description as 325 covering different aspects and topics. Not a continuation of 325.

331 Fluid Dynamics for Nonengineers (3)

Prereq: jr. Not open to engineering students. Physical, not mathematical, introduction to principles controlling fluid motions in our environment. Study of weather, flood circulation, aerodynamics, river hydraulics, and rocketry through design of golf balls and plumbing systems included. Introduction to mechanics, fluid properties, fluids at rest and in motion. Lectures and reading assignments supplemented with films.

334 Water Pollution Control (3)

Prereq: soph, nonengineering students. Designed for student with limited technical background but who is interested in problems of water pollution. Deals with nature of water, source and character of pollutants, technology of wastewater renovation, ecology of water pollution, and legal, economic, and administrative constraints.

337 Transportation Today (3)

Prereq: jr or perm, not open to civil engineering majors. Designed for student with limited technical background who is interested in gaining knowledge in area of highway and transportation planning and design. Major topics include geometric factors, traffic studies, modes of transportation, human equation, and planning strategies.

350 Engineering and the Technological Society (3) (2A)

Prereq: jr or sr. Technical inventions and social inventions, impact and social consequences of engineering public policy issues, ethical considerations, and some exploration of alternative futures. Discussion and lecture format used.

390 Cooperative Education Field Experience III (1)

Prereq: perm. See 190.

400 Professional Engineering Fundamentals Review (2)

Prereq: sr. Review of basic engineering principles. Provides a compact review of basic engineering principles and illustrated by practical solutions.

445 Advanced Numerical Methods (4)

Prereq: ME 497 or equiv. (winter) Numerical methods for solution of ordinary and partial differential equations, stability considerations and error estimates, application to variety of engineering problems, numerical method of lines and integration procedures for stiff ODE systems.

470 Energy and the Environment (3) (2A)

(on demand) Technical, economic, political, and environmental factors in energy production. Conventional, gasification, synfuels, fission, fusion, solar, wind, and possible future conversion techniques. Course designed to provide understanding needed for intelligent participation in societal decisions related to energy issues. (Equiv to MATH 445.)

490 Cooperative Education Field Experience IV (1)

Prereq: perm. See 190.

495 Leadership Seminar (4)

Prereq: ET major, perm. Through selected readings, class presentations, discussions, and case studies, students will seek an understanding of leadership and its importance and effectiveness in achieving goals with followers. Successful leaders in engineering and other fields will visit the class and share their knowledge of leadership. Several written reports and oral presentations on leadership case studies will be required during the term.

English (ENG)**150 Developmental Writing Skills (4)**

Prereq: placement or recommendation. Credit for 150 will not be given to any student who has already passed any other English course. Develops skills through attention to coherence, mechanics, syntax, and writing conventions. Does not satisfy Tier I or Arts and Sciences humanities requirement. (Nonnative speakers take 150A.)

151 Writing and Rhetoric I (5) (1E)

Prereq: fr or soph only; 150, or 151 placement into requested or earlier quarter or into 152/3. Practice in composing and revising expository essays which are well organized, logically coherent, and effective for their purpose and audience. Topics from personal experience or nonfiction reading. (Nonnative speakers take 151A.)

152 Writing and Reading (5) (1E)

Prereq: fr and soph only. Same as 151, except that topics are developed from reading and discussion of fiction, poetry, and/or drama.

153 Writing and Reading: Special Topics (5) (1E)

Prereq: fr and soph only. Similar in structure, genres, and purposes to 152, but each section uses readings and/or clips focused on a specific theme chosen by the instructor. Recent themes include the environment, the Viet-Nam war, the social outsider, *The Brothers Karamazov*, and popular culture.

153A Writing and Reading: Gender (5) (1E)

Prereq: fr and soph only. Same as 152 except that topics are developed from readings depicting women and men in literature. Students examine and write about how, in both literature and life, women and men see themselves and each other, how people learn what society expects of them, and about such topics as sexuality, marriage, friendship, and rebellion against culturally imposed sexual roles.

153B Writing and Reading: African American Experiences (5) (1E)

Prereq: fr and soph only. Same as 152, except that topics are developed from readings examining various experiences of African Americans in America, from earlier writings up to and emphasizing contemporary literature, including fiction, poems, essays, and autobiographies.

200 Introduction to Literature (4) (2H)

Prereq: 151 or 152 or 153 or 153A/B. Approaches to reading and interpreting fiction, poetry, and

drama using skills, techniques, and language of interpretation. Intended for nonmajors.

201 Critical Approaches to Fiction (4)

Close textual analysis of fiction, development of critical vocabulary, and introduction to the variety of current methods of responding to literature. Intended for nonmajors.

202 Critical Approaches to Poetry (4)

Close textual analysis of poetry, development of critical vocabulary, and introduction to the variety of current methods of responding to literature. Intended for nonmajors.

203 Critical Approaches to Drama (4)

Close textual analysis of drama, development of critical vocabulary, and introduction to the variety of current methods of responding to literature. Intended for nonmajors.

203A Interpretation of Drama (Film) (4)

Prereq: 151 or 152 or 153 or 153A/B. Critical study of film and literature, e.g., film adaptations of literary classics, films made by literary authors, etc. May not be taken to fulfill major requirement of two courses from 201, 202, 203.

204 Introduction to International Literature I: The Classical Tradition (4) (2H)

Prereq: one course above 199. Texts which exemplify the classical sensibility in Western literature.

205 Introduction to International Literature II: Romantic Tradition (4) (2H)

Prereq: one course above 199. British, American, and Continental texts which exemplify the Romantic tradition in Western literature.

206 Introduction to International Literature III: The Modern Tradition (4) (2H)

Prereq: one course above 199. Texts which express the modern sensibility in Western literature.

210 Critical Approaches to Popular Literature (4)

Prereq: one course above 150. Introduction to techniques and criticism in works where serious and popular literature meet, e.g., mysteries, science fiction, westerns.

250 Principles of Textual Analysis (4)

Offers undergraduates considering the English major a thorough grounding in textual analysis and critical terminology. Emphasis on generalizable reading strategies rather than investigation of a particular topic.

251 English Lit. to 1688 (5)

Prereq: 250 or concurrent. This course will survey some of the major authors, genres, and movements of the early British period, from the Anglo-Saxons to the Glorious Revolution in the 17th century. The course will include some of the most influential literary figures of the period, but will also give attention to less canonical writers who have attracted increasing scholarly attention in recent years.

252 English Lit. 1689–Present (5)

Prereq: 250 or concurrent. This course will survey some of the major authors, genres, and literary movements of the modern British period, from the Glorious Revolution to the 20th century. The course will include some of the most influential literary figures of the period, and will also give attention to less canonical writers who have attracted increasing scholarly attention in recent years.

253 Survey of American Lit. (5)

Prereq: 250 or concurrent. This course will survey some of the major authors, genres, and movements in American Literature, from the early colonial period to the 20th century. The course will include some of the most influential literary figures in American literature, but will also give attention to less canonical writers who have attracted increasing scholarly attention in recent years.

254 Research and Writing in English Studies (4)

Prereq: 151-2-3; 250 or concur.; not 307J. This course prepares students to use scholarly resources to write critical analyses of texts in English Studies. Students are required to master research methods, library resources, the integration of primary and secondary texts, MLA/Chicago documentation, and the conventions of critical writing. Readings for the course vary, and may include a single long text or several short ones. Students do extensive outside research on the readings, write at least 20 pages

of critical prose based on this research, revise this writing, and make presentations to the class about their work.

270 Special Studies: Individual or Comparative Authors (2-3)

Prereq: one course above 150. Intensive study of individual or comparative authors: (A) Medieval, (B) Renaissance, (C) Restoration and 18th-century, (D) 19th-century American, (E) 19th-century British, (F) 20th-century American, (G) 20th-century British, (H) Continental.

271 Special Studies: Selected Themes or Topics in Literature (2-3)

Prereq: one course above 150. Intensive study of selected theme or topic: (A) poetry, (B) fiction, (C) drama, (D) comparative genres, (E) language, (F) stylistics and rhetoric, (G) literature and film, (H) gay and lesbian, (I) man and books.

277T English Tutorial (1-10)

Prereq: approval from Department of English tutorial director; arts and sciences major. Fall quarter, first year.

278T English Tutorial (1-10)

Prereq: approval from Department of English tutorial director; arts and sciences major. Winter quarter, first year.

280 Expository Writing and the Research Paper (4)

Prereq: one course above 150. Practice in library research, techniques of documentation, and writing research papers.

297T English Tutorial (1-15)

Prereq: HTC student. Fall quarter, first-year course in two-year tutorial sequence.

298T English Tutorial (1-15)

Prereq: HTC student. Winter quarter, first-year course in two-year tutorial sequence.

299T English Tutorial (1-15)

Prereq: HTC student. Spring quarter, first-year course in two-year tutorial sequence.

301 Shakespeare: The Histories (4)

Prereq: 251 or jr or sr.

302 Shakespeare: The Comedies (4)

Prereq: 251 or jr or sr.

303 Shakespeare: The Tragedies (4)

Prereq: 251 or jr or sr.

304 English Bible (4)

Prereq: one course above 150. Selected prose and poetry of the Hebrew and Christian scriptures.

305J Technical Writing (4) (1J)

Prereq: jr and completion of first-year composition. Preparing clear, functional reports; presenting data for experts and other specialized audiences. Documents include, but are not limited to, proposals; information reports (progress, feasibility, inspection, completion); and descriptions of mechanisms and technical processes.

306J Women and Writing (4) (1J)

Prereq: jr and completion of first-year composition. Practice in developing essays on women and their interests, on women and writing, and on gender issues.

307J Writing and Research in English Studies (4) (1J)

Prereq: jr or sr; two courses from 201, 202, 203. Scholarly writing in English studies: research reports, integration of primary and secondary texts, library resources, and MLA/Chicago documentation.

308J Writing and Rhetoric II (4) (1J)

Prereq: jr or sr and completion of first-year composition. Focuses on skills in writing expository prose, with regular practice and evaluation supplemented by attention to published prose and concepts of rhetoric and style.

309J Writing in the Sciences (4)

Prereq: jr or sr; completion of first year composition; and permission of instructor. The primary purpose of this course is to provide students in the sciences with an opportunity to practice writing within their majors. The course focuses on how to review prior research, how to propose research projects, how to incorporate research results into final reports, and how to write clearly and concisely.

311 English Literature to 1500 (4)

Prereq: 251. Authors, works, and genres of Old and Middle English literature.

312 English Literature: 1500-1660 (4)

Prereq: 251. Authors, works, and genres of Renaissance English literature.

313 English Literature: 1660-1800 (4)

Prereq: 252. Authors, works, and genres of Restoration and 18th-century English literature.

314 English Literature: 1800-1900 (4)

Prereq: 252. Authors, works, and genres of Romantic and Victorian English literature.

315 English Literature: 1900 to Present (4)

Prereq: 252. Authors, works, and genres of British literature from 1900 to the present.

321 American Literature to 1865 (4)

Prereq: 253. Authors, works, and genres of American literature from the colonial period through the Civil War.

322 American Literature: 1865-1918 (4)

Prereq: 253. Authors, works, and genres of American literature from the end of the Civil War to the end of World War I.

323 American Literature: 1918 to Present (4)

Prereq: 253. Authors, works, and genres of American literature from the end of World War I to the present.

325 Women and Literature (4)

Prereq: one course above 199 and jr or sr. Surveys work of significant women writers.

326 Lesbian and Gay Literature (4)

Prereq: one course above English 150. Surveys lesbian, gay, bisexual, and transgendered (LGBT) literature with an emphasis on how LGBT identities and experiences have been represented in post-1900 literary discourse.

327 African American Fiction (4)

Prereq: one course above 150. A selection of major fiction by African American authors.

328 African American Poetry (4)

Prereq: one course above 150. A selection of major poetry by African American authors.

329 African American Drama (4)

Prereq: one course above 150. A chronological survey of major drama by African American authors.

331 Studies in Asian Literature (4) (2C)

(fall) Introduction to cultural background of Asian literature.

332 Studies in Asian Literature (4) (2C)

(winter) Continuation of 331. Study of classical Asian literature.

333 Studies in Asian Literature (4) (2C)

(spring) Continuation of 332. Study of modern Asian literature.

335 The Ohio University Writers (4)

Faculty writers at OU visit classrooms to read and discuss their works.

336 McGuffey Lectureship in Literature (1-4)

Prereq: one course above 150. Special series of lectures by current McGuffey Visiting Professor of English. Lectures offered determine credit hrs assigned.

342 English and Continental Literature (4)

Prereq: one course above 150. Authors, themes, and genres in English and European literature.

349 History of Books and Printing (4)

Prereq: one course above 150. Introduction to history of the book and its place in development of Western culture from ancient world to present. Approach is primarily historical, cultural, and aesthetic.

350 Traditional Grammar, Mechanics, and Usage (4)

Prereq: one course above 150. Grammatical understanding and awareness of relationships in sentence structure, usage, and punctuation.

351 The History of the English Language (4)

Prereq: jr or sr. Course examines changes affecting English; sound patterns, grammatical forms, vocabulary, and semantic values.

352 The Development of American English (4)

Prereq: jr or sr. Regional and social varieties of American English.

353 The Structure of American English (4)

Prereq: jr or sr. Study of English grammar using a linguistic model chosen from contemporary linguistic theories.

356 Young Adult Literature (4)

Prereq: 250. Historical development, and philosophical and aesthetic bases of literature for young adults.

361 Creative Writing: Fiction (4)

Prereq: 200 or 201 or 250. Beginning course in writing short fiction with emphasis on invention, craft, and criticism of student writing and published fiction.

362 Creative Writing: Poetry (4)

Prereq: 200 or 202 or 250. Beginning course in writing poetry with emphasis on invention, craft, and criticism of student writing and published poetry.

363 Creative Writing: Nonfiction (4)

Prereq: 200 or 201 or 250. Beginning course in writing nonfiction with emphasis on invention, craft, and criticism of student writing and published nonfiction.

377T English Tutorial (1-10)

Prereq: approval from Department of English tutorial director; arts and sciences major. Spring quarter, first year.

378T English Tutorial (1-10)

Prereq: approval from Department of English tutorial director; arts and sciences major. Fall quarter, second year.

393 Creative Writing Workshop: Short Story (4)

Prereq: 361. Instruction and practice in fiction writing, concentrating on narrative, character, and setting.

394 Creative Writing Workshop: Poetry (4)

Prereq: 362. Instruction and practice in poetry writing.

395 Creative Writing Workshop: Nonfiction (4)

Prereq: 363. Instruction and practice in writing nonfiction prose, with attention to fictionalized biography and literary essays.

397T English Tutorial (1-15)

Prereq: HTC student. Fall quarter, second-year course in two-year tutorial sequence.

398T English Tutorial (1-15)

Prereq: HTC student. Winter quarter, second-year course in two-year tutorial sequence.

399 Literary Theory (4)

Prereq: 250, 301-303, 310-323. Recent issues in literary theory and the study of literary texts.

399T English Tutorial (1-15)

Prereq: HTC student. Spring quarter, second-year course in two-year tutorial sequence.

430 American Literature (3)

Prereq: enrollment in Inst. Amer. Cult. Modern and contemporary American literature as part of the annual summer Institute in American Culture for Austrian Students and Teachers.

441 Colloquium (4)

Prereq: sr. (fall) Specific interdisciplinary problems to be assigned each quarter.

442 Colloquium (4)

Prereq: sr. (winter)

443 Colloquium (4)

Prereq: sr. (spring)

445 Special Studies (4)

Prereq: sr.

447 Studies in Criticism (4)

Prereq: sr. Problems in critical theory.

451 Teaching Language and Composition (3)

Prereq: sr, advanced standing in professional education. Content and methods of presentation for teaching language and composition in high school. Not applicable to Arts and Sciences 200-level requirement.

451L Field Experience in Secondary English/Language and Composition (1)

Prereq: sr; concurrent with 451. Field experience to provide practical applications of materials, methods, and techniques of language and composition instruction as appropriate in various secondary

school settings. Students will observe classroom teachers and carry out various instructional tasks as the cooperating teachers deem appropriate.

452 Teaching Literature (3)

Prereq: sr, advanced standing in professional education. Content and methods of presentation for teaching literature in high school. Not applicable to Arts and Sciences 200-level requirement.

452L Field Experience in Secondary English/Literature (1)

Prereq: sr; concurrent with 452. Field experience to provide practical application of materials, methods, and techniques of literature instruction as appropriate in various secondary school settings. Students will observe classroom teachers and carry out various instructional tasks as the cooperating teachers deem appropriate.

453 Studies in World Literature (4)

Prereq: 399. Examines contemporary world literature with an emphasis on non-Western texts (i.e., African, Indian, Latin American, Eastern European, etc.) to let students explore various cultural voices. Investigates cultural diversity through close analysis of texts. Addresses current literary discussions on decolonization, the postcolonial condition, eurocentrism, displacement, and multiculturalism. Intended for students in secondary education program.

455 English Education Workshop (1-5)

Prereq: teaching certificate or equiv, or perm. Studies in principles, problems, approaches, and issues in teaching English from elementary school to post-secondary. Topics vary.

456 Readings in Children's Literature (4)

Prereq: one course above 199. Historical development of children's literature; philosophical and aesthetic bases.

457 Readings in English Education (4)

Prereq: jr or sr. Recent developments in English education and application to teaching of jr and sr high school English.

460 Literary Topics (4)

Prereq: Three courses from 310-323 and sr. Concentrated attention to one literary topic, e.g., a genre, theme, rhetoric, or literary theory. Topics are announced quarterly in the departmental course description booklet available in Ellis Hall.

464 Major English Authors (4)

Prereq: Three courses from 310-323 and sr. Authors to be studied vary section to section, quarter to quarter, and are announced quarterly at preregistration in the departmental course description booklet available in Ellis Hall.

465 Major American Authors (4)

Prereq: Three courses from 310-323 and sr. Authors to be studied vary section to section, quarter to quarter, and are announced quarterly at preregistration in the departmental course description booklet available in Ellis Hall.

466 Major International Authors (4)

Prereq: Three courses from 310-323 and sr. Authors to be studied vary section to section, quarter to quarter, and are announced quarterly at preregistration in the departmental course description booklet available in Ellis Hall.

477T English Tutorial (1-10)

Prereq: approval from Department of English tutorial director; arts and sciences major. Winter quarter, second year.

478T English Tutorial (1-10)

Prereq: approval from Department of English tutorial director; arts and sciences major. Spring quarter, second year.

481 Form and Theory of Literary Genres: Fiction (4)

Prereq: 8 hrs creative writing. Theoretical considerations of fiction.

482 Form and Theory of Literary Genres: Poetry (4)

Prereq: 8 hrs creative writing. Theoretical considerations of poetry.

483 Form and Theory of Literary Genres: Nonfiction (4)

Prereq: 363, 395, and perm. Theoretical considerations of nonfiction.

486 Advanced Workshop in Fiction (4)

Prereq: 393 and perm in advance.

487 Advanced Workshop in Poetry (4)

Prereq: 394 and perm in advance.

488 Advanced Workshop in Nonfiction (4)

Prereq: 395. This is the third in the sequence of three nonfiction writing workshops. Students will be expected to produce at least three essays in workshop, participate in advanced readings in the form, and submit a final portfolio.

490 Independent Reading (1-15)

Prereq: perm. Directed individual reading and research.

491 English Internship (1-10)

Prereq: sr. and perm of internship coordinator. Provides qualified students with opportunity to learn through working at selected sites.

497T English Tutorial (1-15)

Prereq: HTC student. (fall) Thesis.

498T English Tutorial (1-15)

Prereq: HTC student. (winter) Thesis.

499H Honors Project (5-15)

Prereq: perm. Completion of individual writing project for A.B. with honors in English.

499T English Tutorial (1-15)

Prereq: HTC student. (spring) Thesis.

Humanities (HUM)

107 Humanities—Great Books (4) (2H)

Prereq: fr and soph only. (fall) Ancient classics of Western civilization (Greek, Roman, Biblical) leading toward understanding of cultural heritage. Guidance in critical thinking, reading, and writing about those works.

108 Humanities—Great Books (4) (2H)

Prereq: fr and soph only. (winter) Medieval and Renaissance classics of Western civilization. See 107 for further description.

109 Humanities—Great Books (4) (2H)

Prereq: fr and soph only. (spring) Modern classics of Western civilization (18th-20th centuries). See 107 for further description.

117 Humanities—Great Books of the Orient (4) (2H)

Prereq: fr and soph only. Masterpieces (both ancient and modern) of India, China, and Japan, leading toward understanding of Oriental culture.

307 Humanities—Great Books (4)

Prereq: jr and sr only. (fall) Ancient classics of Western civilization (Greek, Roman, Biblical) leading toward understanding of cultural heritage. Guidance in critical thinking, reading, and writing about those works. (Credit not allowed for both 107 and 307.)

308 Humanities—Great Books (4)

Prereq: jr and sr only. (winter) Medieval and Renaissance classics of Western civilization. See 307 for further description. (Credit not allowed for both 108 and 308.)

309 Humanities—Great Books (4)

Prereq: jr and sr only. (spring) Modern classics of Western civilization (18th-20th centuries). See 307 for further description. (Credit not allowed for both 109 and 309.)

Environmental and Plant Biology (PBIO)

100 The World of Plants (4) (2N)

(fall, winter) A. Trese. For nonscience majors. Survey of variety of plants and how they affect and are affected by humans. 4 lec.

100L The World of Plants with Laboratory (5) (2N)

(fall, winter) A. Trese. Same lecture as 100 with additional laboratory to provide practical experience with plants and topics discussed in lecture. 4 lec, 2 lab.

102 Plant Biology (5) (2N)

(fall, winter) For nonscience majors. Not offered on the Athens campus. Structure of seed plants as related to function. Survey of plants, with emphasis on life histories, reproduction, and relationships of selected plant groups. Credit not allowed for both 102 and 111. 4 lec, 2 lab.

103 Plants and People (4) (2A)

Interrelationships of plants and humans from

both historical and modern points of view, origins of agriculture and civilization, tropical and temperate food plants, medicinal plants, drug plants, destruction of environment, and its ultimate effect on food plants. 4 lec.

109 Americans and their Forests: Ecology, Conservation and Policy (4) (2N)

(spring) G. Matlack. The course provides an understanding of modern forests encompassing both recent and long-term effects arising from natural and human causes. The pattern and character of forest utilization will be interpreted in terms of varied cultural experiences in different regions and times. 4 lec.

114 Foundations of Plant Biology (5) (2N)

(fall, spring) S. Wyatt. The course is an introduction to the concepts of plant physiology and cellular and molecular biology that are the foundation of all biological processes. Topics include DNA structure and function leading to genetics and evolution, theories of the origins of life leading to cell structure and function, and bioenergetics. The lab provides supplemental information and hands-on activities to reinforce the lecture topics. No credit if PBIO 110 or BIOS 170. 3 lec, 4 lab.

115 Plant Structure and Development (4) (2N)

(spring) G. Rothwell. For plant biology and other science majors, preprofessional students and science modular students. Introduction to structure, growth, development, and reproductive biology of plants with emphasis on flowering plants. No credit if PBIO 102 or 111. 3 lec, 2 lab.

209 Plant Ecology (4) (2N)

(winter) K. Brown. Basic concepts, theory, and applied aspects of plant ecology. Focus on the interactions of plants with their environment (biotic and abiotic) over a range of spatial and temporal scales. No credit if PBIO 425. 4 lec.

210 Plant Physiology (4)

prereq: PBIO 110 or 114 or BIOS 170; PBIO 111 or 115 (winter) A. Faik. The regulation of plant growth and development by internal and external factors, the acquisition of water and nutrients by plants, and the movement of water and solutes through plants. No credit if PBIO 424. 3 lec, 2 lab.

211 Diversity of Life (5)

prereq: PBIO 110 or 114 or BIOS 170 or BIOL 101 (winter) P. Cantino. For plant biology and other science majors, preprofessional students, and science modular students. Survey of life cycles, morphology, and phylogeny of major groups of organisms, with emphasis on plants, fungi, and protists. No credit if PBIO 111. 3 lec, 4 lab.

220 Woody Plants (4)

(summer) Not intended for plant biology majors. Introduction to identification of woody plants, and to the use of keys in plant identification. Credit not allowed if 248 completed. 2 lec, 4 lab.

225 Flowers (4)

(summer) Not intended for plant biology majors. Identification of local flowers and discussion of the role of flowers in their natural environments. Credit not allowed if 309 completed. 2 lec, 4 lab.

248 Trees and Shrubs (Dendrology) (4)

(fall) P. Cantino. Identification, nomenclature, classification, ecological relationships, and importance to humans of native and introduced woody plants. 2 lec, 4 lab, supplementary field trips.

297T Plant Biology Tutorial (1-15)

Prereq: Tutorial college. (fall)

298T Plant Biology Tutorial (1-15)

Prereq: Tutorial college. (winter)

299T Plant Biology Tutorial (1-15)

Prereq: Tutorial college. (spring)

307 Morphology of Algae and Bryophytes (6)

Prereq: 111 or 211. (spring, even years) M. Vis-Chiasson. Comparative studies of structure, evolutionary relationships, life histories, and reproduction of selected representatives of major groups of algae and bryophytes. 3 lec, 1 disc, 4 lab.

308 Morphology of Vascular Plants (6)

Prereq: 111 or (115 and 211). (fall, even years) G. Rothwell. Diversity of vascular plants as reflected by structural, developmental, and reproductive features of major groups; emphasis on evolution of diversity through systematically significant adaptations. 3 lec, 6 lab.

309 Plant Systematics and Ohio Flora (6)
Prereq: 111 or 211. (spring) *P. Cantino* odd years; *H. Ballard* even years. Principles and methods of systematics and taxonomy; classification, floral biology, and evolution of flowering plants. Lab: identification and classification of spring flora. 3 lec, 6 lab, field trips.

310 Biology of Fungi (5)
Prereq: 111 or 211. (fall) *A. Trese*. Morphology and life history studies of selected fungi of major groups; collection, isolation, and growth of selected fungi; fungal activities. 4 lec, 2 lab.

313 Special Topics in Plant Biology (1-6)
Current and/or special topics in plant biology.

313B Supervised Study (1-3)
Prereq: plant biology majors.

322 Tropical Plant Ecology (4)
Prereq: PBIO 209 or 425 or BIOS 375. (fall) *G. Matlack*. Tropical rainforest studies around the world, including basic plant ecology, conservation, and management. 4 lec.

331 Plant Genetics (5)
Prereq: 110 or 114 or BIOS 170. (spring) *H. Ballard* and *S. Wyatt*. Basic principles of genetics as they relate to plants, including transmission, expression, and evolution of genetic materials. 5 lec.

353 Plant Developmental Physiology (4)
Prereq: 110 or 114 or BIOS 170. (spring, odd years) *S. Wyatt*. Growth and development in flowering plants. Topics include cell growth and differentiation in developing meristems, tissue and organ development in culture, dormancy and germination, flower induction, seed formation, growth regulators, and senescence. 4 lec.

397T Plant Biology Tutorial (1-15)
Prereq: Tutorial college. (fall)

398T Plant Biology Tutorial (1-15)
Prereq: Tutorial college. (winter)

399T Plant Biology Tutorial (1-15)
Prereq: Tutorial college. (spring)

404 Undergraduate Research (3-6, max 6)
Prereq: 17 hrs plant biology and jr standing. Independent research under supervision of faculty member.

406 Undergraduate Research/ Written Presentation (3-4)
Prereq: 17 hrs plant biology and jr standing. An independent research experience that includes a formal written presentation of the work. All work will be done under the supervision of a faculty member. No credit if PBIO 499H taken.

407 Undergraduate Research/ Oral Presentation (3-4)
Prereq: 17 hrs plant biology and jr standing. An independent research experience that includes a formal oral presentation of the work. All work will be done under the supervision of a faculty member.

409 Biological Discussions (2)
Seminar presentations and discussions on selected plant biology topics. 2 disc.

410 Plants and Soil (4)
Prereq: 111 or 211; 2 qtrs chemistry. (winter) *J. DeForest*. Soil as environment for plant growth; interrelationships between plant and soil; role of soil organisms in cyclic processes; building and maintenance of soil fertility; relationships between soil and health of plants, animals, and humans. 3 lec, 2 lab.

412 Plant Pathology (5)
Prereq: 111 or 211 (fall, odd years) *A. Trese*. Diseases of plants; history, types of pathogens and disease cycles, impact in nature and agriculture, disease control strategies. Isolation and identification of pathogens. 3 lec, 4 lab.

415 Quantitative Methods in Plant Biology (5)
Prereq: PSY 221; 24 hrs of PBIO courses. (winter) *B. McCarthy*. Lecture: biostatistics and applications in the plant sciences; scientific method, hypothesis testing, and design of experiments; sampling, data analysis, regression and correlation, analysis of variance, and parametric and nonparametric statistics. Lab: microcomputer applications in spreadsheet analysis, statistics, and graphics. 4 lec, 2 lab.

418 Writing in the Life Sciences (4)
Prereq: Jr, 15 hrs PBIO or BIOS (winter) *S. Wyatt*. Current research and public controversy dealing with topics in biology and plant science will provide students with opportunities to practice and master skills needed for successful written communication in the fields of plant science and biology. No credit toward major. 4 lec.

420 Phycology (5)
Prereq: 111 or 211. (spring, odd years) *M. Vis-Chiasson*. Taxonomy and ecology of marine and freshwater algae, with emphasis on identification and distribution of common or representative genera. 3 lec, 4 lab.

424 Plant Physiology (6)
Prereq: 210 or 353; organic chemistry recommended. (spring). *A. Faik*. Basic chemical and physical aspects of plant physiology; photosynthesis, respiration, mineral nutrition, transport, nitrogen metabolism, water relations, and growth. 3 lec, 4 lab.

426 Physiological Plant Ecology (5)
Prereq: 209 or 425. (spring, odd years) *K. Brown*. A survey of the complexity of plant physiological and structural adaptations that relate to their ecological performance. Comparisons of plant characteristics from many biomes. Emphasis on reading and discussing peer-reviewed literature. Labs feature hands-on learning of microclimate techniques, physiological protocols, synthesis and interpretation of data. 3 lec, 4 lab, 1 Saturday field trip.

427 Molecular Genetics (3)
Prereq: 331 or 431 or BIOS 325; organic chemistry. (spring) *A. Showalter*. Genetic fine structure and function at the molecular level; biochemical aspects of heredity in micro-organisms, plants, and animals; recombinant DNA and genetic engineering. 3 lec.

431 Plant Cell Biology (5)
Prereq: 110 or 114 or BIOS 170. (fall) *A. Faik*. Structure and function of cells, organelles, and cellular inclusions. 3 lec, 4 lab.

435 Plant Population Biology (5)
prereq: PBIO 209 or 425 or BIOS 375 (winter, even years) *G. Matlack*. Acquaint students with basic demographic processes as experienced by plant populations; 2) explore the demographic implications of a range of plant growth forms and life histories; 3) present the material in the context of a variety of models. The course will take an evolutionary/behavioral approach to plant populations. 3 lec, 4 lab.

436 Plant Community Ecology (5)
prereq: PBIO 209 or 425 or BIOS 375; PSY 221 (fall, even years) *B. McCarthy*. Advanced concepts and theory of plant community ecology. Emphasis will be placed on the interplay between theory and empirical studies. Classic literature will be reviewed and case studies developed from the modern literature to explore current ideas of theory, approach, and experimentation. Laboratories will emphasize modern field methods of vegetation analysis and environmental assessment. 3 lec, 4 lab.

437 Ecosystem Ecology (4)
Prereq: CHEM 122 or 152; PBIO 209 or BIOS 375 (fall) *K. Brown*. Analysis of the composition, function, and heterogeneity of ecosystems. Topics include: atmospheric, climate and geological controls on ecosystem function, comparisons of aquatic and terrestrial ecosystems, ecosystem production, nutrient cycling and trophic dynamics. Synthesis with evaluation of human impacts on ecosystems, locally and globally. 4 lec.

442 Experimental Anatomy of Plant Development (6)
Prereq: PBIO 210 or 424 (winter) *S. Wyatt* and *G. Rothwell*. The concepts of plant development have been integrated with the descriptive assessment of cell, tissue, and organ types that are the mainstay of plant anatomy to provide an exciting opportunity for all plant biologists. The course is grounded in experimentation and includes cutting edge methodologies. 3 lec, 6 lab. *This is a Tier III equivalent course.*

450 Biotechnology and Genetic Engineering (4)
Prereq: 110 or 114 or BIOS 170. (fall) *A. Showalter*. For upper level undergraduate students. Introduction to basic molecular biological concepts and techniques in biotechnology and genetic engineering, including discussion of current experimentation and progress in these fields. 4 lec.

460 Paleobotany (6)
111 or 211 *G. Rothwell*. Morphology and evolution of representative fossil plant groups. 3 lec, 6 lab.

475 Plant Speciation and Evolution (3)
Prereq: jr or sr majors in PBIO, BIOS. (winter, even years) *H. Ballard*. Principles of evolution of plants and current topics in evolutionary biology. 3 lec.

480 Molecular Approaches in Plant Systematics, Ecology and Evolution (5)
prereq: 111 or 211 or BIOS 170 (winter, odd years) *H. Ballard*. Overview of comparative molecular approaches used to infer relationships in plants at level of populations, species and lineages. 3 lec, 4 lab.

485 Plant Biology Capstone (6)
Prereq: (PBIO 209 and PBIO 211) and (PBIO 322 or PBIO 409). Capstone short-term field course for natural science majors, integrating principles across organismal plant biology and related disciplines, in a selected (often international) region. 4 lec, 4 lab.

490 Internship (max 10)
Prereq: permission. Provides students with credit for work experience in various applied fields of botany and environmental biology. Overseen by a faculty member and evaluated by the on-the-job supervisor. Report culminates experience.

497T Plant Biology Tutorial (1-15)
Prereq: Tutorial college. (fall)

498T Plant Biology Tutorial (1-15)
Prereq: Tutorial college. (winter)

499T Plant Biology Tutorial (1-15)
Prereq: Tutorial college. (spring)

499H Thesis (3-6)
Prereq: PBIO 404 or 407; g.p.a. of at least 3.5. Preparation of an honors thesis based on original research. No credit if PBIO 406 taken.

Environmental Engineering Technology (EVT)

The following courses for the A.A.S. in environmental engineering technology are available only on the Chillicothe campus:

100 Introduction to Environmental Engineering Technology (3)
Topics include toxicology, air pollution, groundwater contamination, transportation of hazardous materials, waste characterization, waste management, and waste treatment and disposal, with discussion of how regulations affect each.

110 Computational Methods in Environmental Engineering Technology (3)
Emphasizes the principles of data treatment, including experimental error recognition, statistical analysis, and graphical data techniques using up-to-date computer software. Computers and programmable calculators will be required for writing lab reports. 3 lec, 2 lab.

115 Legal Aspects of Environmental Engineering (2)
Introduction to legal aspects of the rights and duties of the individual, business, and society with regard to the environment, and the consequences of future environmental legislation. Investigates environmental legislation and regulations and examines case studies highlighting the existing laws.

120 Introduction to Environmental Chemistry (3)
Prereq: CHEM 121 or 151. Environmental chemistry as applied to aquatic, atmospheric, soil, and hazardous waste systems. Topics include environmental chemical cycles; aquatic, atmospheric, and soil chemistry; environmental chemistry of hazardous wastes; and toxicology. 2 lec, 2 lab.

125 HAZWOPER Training (3)
Provides certification required to work on a majority of environmental cleanup sites. Covers regulatory obligations, handling hazardous materials, personal protective equipment, monitoring instrumentation, emergency response, site control, medical assessment, confined space entry, and respiratory protection. 3 lec, 2 lab.

125L HAZWOPER Training Laboratory (1)
Emphasizes handling hazardous materials with use of personal protective equipment, instrumentation, and equipment. Outdoor simulations and demonstrations included. 3 lab.

140 Introduction to Air Pollution (3)
Prereq: 110; CHEM 121 or 151. Principal types; sources; dispersion; effects; and physical, economic, and legal aspects of controlling atmospheric pollutants. Emphasizes atmospheric chemical reactions due to air pollutant emissions.

150 Instrumentation in Environmental Analysis (3)
Prereq: 110; CHEM 121 or 151. Provides foundation for understanding principles behind instrumentation used for environmental analysis. Gas chromatographs, mass spectrometers, infrared spectrophotometers, FIDs, and PIDs are studied. 3 lec, 3 lab.

190 Internship/Practicum/Cooperative Education (1, max 20)
Required for students on approved work assignments. Must submit final report on work activities. Credit is not applicable toward specific degree requirements but will accumulate in academic credit total.

198A-Z Special Topics (1-5, max 20)
Provides an opportunity to complete individual projects that involve special topics concerning environmental engineering technology problems.

200 Site Investigation, Sampling, and Monitoring (3)
Prereq: 110. Field-oriented course involving hazardous materials site investigation, characterization, and cleanup. Topics are planning and organization, training and medical programs, site assessment, sampling and monitoring, site control, hazardous materials handling, and emergency response.

200L Site Investigation, Sampling, and Monitoring Laboratory (1)
Prereq: 110. Field-oriented course involving hazardous materials site investigation, characterization, and cleanup. Topics are planning and organization, training and medical programs, site assessment, sampling and monitoring, site control, hazardous materials handling, and emergency response. 3 lab.

210 Introduction to Health Physics (3)
Addresses fundamental principles of health physics and radiation protection. Topics include atomic structure, types of radiation, radioactive decay, methods of radiation detection, dosimetry, biological effects, and radiation protection.

210L Health Physics Laboratory (1)
Emphasizes use of health physics instrumentation including rate meters, scintillation cells, radon detection, and gamma spectrometry as they apply to personal and environmental monitoring. 3 lab.

220 Fluid Mechanics (3)
Prereq: 110. Fundamentals of fluid mechanics as applied to surface and groundwater, wastewater, and air emissions management. Topics include basic hydraulics, friction loss, pressure, flow measurement, pump types and characteristics, and schematic interpretation.

240 Air Sampling and Analysis (3)
Prereq: 110, 140. Provides practical field experience in ambient air and indoor sampling. Instrumentation is used to provide real-time data collection and analysis. Emphasis on methods that determine the concentration of normally encountered air pollutants.

240L Air Sampling and Analysis Laboratory (1)
Prereq: 110, 140. Emphasizes air flow measurements using devices that demonstrate volumetric displacement, velocity impact, viscosity, and pressure. Provides techniques for determining accuracy, precision or repeatability, and calibration. 3 lab.

245 Wastewater Treatment (3)
Prereq: 110, 120. Introduction to wastewater treatment technologies. Covers regulations and phases of treatment for wastewater treatment systems, liquid/solid waste streams, and basic system process control.

250 Analysis of Environmental Pollutants (3)
Prereq: CHEM 121 and 122, or 151 and 152. Covers important techniques necessary for analyzing environmental samples. Methods established by EPA are used to analyze samples for heavy metals, volatiles, and semi-volatiles.

250L Analysis of Environmental Pollutants Laboratory (1)
Prereq: CHEM 121 and 122, or 151 and 152. Emphasizes lab instrumentation such as GC/MS, AA, and IR spectrophotometer. Lab reports required from the analysis of soil and water samples. 3 lab.

260 Environmental Risk Assessment (3)
Analyzes risk assessment process applied to environmental problems. Uncertainty factors, risk analysis, and exposure characterization, fate, and transport models will be addressed.

290 Internship/Practicum/Cooperative Education (1, max 20)
Required for students on approved work assignments. Must submit final report on work activities. Credit is not applicable toward specific degree requirements but will accumulate in academic credit total.

298A-Z Special Topics (1-5, max 20)
Provides an opportunity to complete individual projects that involve special topics concerning environmental engineering technology problems.

Equine Studies (EQU)

The following courses for the A.A.S. in equine studies are available only on the Southern campus:

101 Introduction to Equine Studies (4)
Overview of the history of the horse, evaluation, selection, breeds, equipment, nutritional requirements, safe handling of horses, shoeing, equine reproduction, and career and leadership opportunities in the horse industry.

110 Equine Nutrition (4)
Study of the equine digestive system, nutrient requirements of horses at various levels of performance, and problems associated with feeds and feeding practices.

120 Equine Anatomy and Physiology (4)
Prereq: BIOL 101. Study of the structure and functions of the horse through the various anatomical systems.

125 Equine First Aid and Preventive Medicine (5)
First aid and emergency treatments, preventive medicine, diseases, and parasitism in horses.

130 Equine Evaluation and Selection (3)
Prereq: 101. Study of the types, evaluation, and selection of purebred horses.

200 Equine Reproduction (4)
Prereq: 101. Comprehensive study of equine reproduction stressing the anatomy and physiology of the stallion and mare and methods of breeding, including artificial insemination, and foaling.

215 Equine Business Management (4)
Prereq: CS 120. Study and practice of basic concepts, techniques, procedures of accounting involved in keeping and analyzing equine records from the management viewpoint. Designed to integrate general business concepts with common practices in the horse industry. Topics include general business laws, equine law, public relations, insurance, bookkeeping, contracts, taxes, and starting and maintaining a horse operation.

220 Farm and Stable Management (4)
Study of the management of a working horse farm. Topics include scheduling, budgeting, equipment use and maintenance, land management, facilities management, site selection and design, and safety.

225 Equestrian Teaching Techniques (3)
Study of the methods of teaching riding. Emphasis on the abilities and skills a good instructor must possess to teach riding as well as the safety, care, and evaluation of school horses. Students will develop and implement teaching plans for riders at the beginning level.

230 Comprehensive and Competitive Horse Judging (3)
Prereq: 130. Continuation of 130. Activity through which students can put assimilated knowledge to practical application and assess knowledge competing on the OU Horse Judging Team. Travel required. Written and oral defense also required.

235 Horse Show and Event Management (3)
Designed to provide students with the necessary tools to organize any show, event, or clinic related to the equine industry. Major topics include planning, fund raising, financing, insurance, record keeping, and advertising. Utilization of principles to plan and operate a horse show and/or clinic for OU-Southern or associated organization.

240 Basic Horse Shoeing (3)
Shoeing and balancing of pleasure and performance horses, corrective trimming, hoof health, anatomy of the leg and foot, and blacksmithing as a business.

250 Harnessing and Driving (1)
Knowledge and fundamental skills used in line driving, lunging, harnessing, and pleasure driving.

280 Fundamentals of Starting the Young Horse (2)
Prereq: PED 168, 172, 173, 176, 177, or 180. Development of advanced riding skills including handling, gentling, saddling, and riding a green-broke horse applying basic horsemanship skills.

281 Fundamentals of Starting the Young Horse II (2)
Prereq: 280. Continuing to develop advanced riding skills necessary to train a green broke horse by understanding and implementing specific standard training procedures. Student will have responsibility for an assigned young horse, teaching that horse to walk, trot, lope, back, and turn around under saddle. Horses will be trained according to their intended uses.

282 Therapeutic Riding (3)
Study of the fundamental knowledge and skills related to the therapeutic riding concept. Topics include evaluating and training a horse for therapeutic riding activities, basic state and federal laws addressing people with disabilities, and behavioral concerns with identification of alternative approaches. A supervised experience in therapeutic riding techniques is part of the course.

283 Therapeutic Facility Design and Management (3)
This course makes students aware of the difficulties therapeutic riding clients face in day to day life. Through careful design and management, clients can ride safely and care for program horses.

284 Techniques for Teaching the Therapeutic Rider (4)
This course encourages students to understand and work with riders with disabilities and challenges. It is essential for instructors to research and know the issues these riders face and formulate lesson plans according to individual needs and goals.

285 Preparation for Therapeutic Riding Instructor Certification (3)
Designed to prepare students for the Registered Level Therapeutic Riding Exam offered by the North American Riding for the Handicapped Association. The course covers all components of the test and provides lecture and active experience with immediate evaluation and feedback.

286 Administrative Aspects of Therapeutic Riding (3)
Provides information on administrative issues and aspects of therapeutic riding, the riding center, and overall management. The course includes goal setting, strategic planning, legal issues, and working with boards.

287 Evaluation and Training of the Therapy Horse (2)
This course rounds out the therapeutic riding student's education to include evaluation and training of horses brought into a therapy program. This knowledge and awareness increases the safety and therapeutic value of the sessions for the therapeutic riding client.

290 Equine Field Experience (1-6)
Field experience which might include trips to horse farms, race tracks, veterinary clinics, museums, horse shows or events, or seminars offered through recognized organizations or individuals.

295 Equine Internship (1-6)

Practical experience in a specific area of equine studies pertinent to the individual's interests. Examples include working with breeders, trainers, farm and stable managers, riding instructors, breed associations or organizations, veterinarians, and related equine agencies.

299 Studies in Equine Issues (1-4)

Study of topics of current interest in the horse industry.

Film (FILM)**201 Introduction to Film I (4) (2H)**

Prereq: soph. (fall) Studies in the history of world cinema, from 1895 to the present. Weekly screenings of silent and sound, American and international films.

202 Introduction to Film II (4) (2H)

Prereq: soph. (winter) Introduction to film analysis, with emphasis on formal aspects of film art such as sound, lighting, mise-en-scene, etc. Weekly screenings.

203 Introduction to Film III (4) (2H)

Prereq: soph. (spring) Special topics in film styles, genres, movements, and forms. Weekly screenings.

338 Studies in the Documentary Film (3)

Prereq: 203. (winter) Special topics in the history, theory, and criticism of documentary film and video. Weekly screenings.

340 Film Techniques (4)

Prereq: 201. Introduction to motion picture production techniques. Students will design, shoot, and edit their own projects.

343 Scriptwriting (4)

Prereq: 201 or 202. Introduction to craft of developing narrative screenplay. Workshop/tutorial approach to study of screenplay structure, format, dialogue, and theory culminating in a 20- to 30-minute completed script.

344J The Practice of Film Criticism (4) (1J)

Prereq: 201 or 202. Survey of film criticism examining styles and techniques of established film critics. Students assigned series of exercises in critical writing. Meets junior-level English requirement.

421 International Film I (4)

Prereq: 201. Analysis of the relationship between film and culture, with emphasis on how cultural meanings influence film aesthetics and the critical assessment of the medium. Films of several film-making nations such as Brazil, China, India, Sweden, and the United States will be screened for study.

422 International Film II (4)

Prereq: 201. The development of a nation's or cultural region's films is traced, with emphasis on contemporary works. Cultures under study will vary quarterly and may include the films of Brazil, China, Germany, Eastern Europe, Italy, Southeast Asia, etc.

423 International Film III (4)

Prereq: 201. The aesthetics and uses of film and related technologies in the study of both Western and non-Western peoples is studied, with emphasis on the ethnographic and documentary film. Assignments include field exercises with image-making equipment.

431 Film History I (4)

Prereq: 201 or 202. (fall) Advanced study of the history and historiography of the motion picture. Emphasis on alternatives to the film canon and revisionist approaches to film history. Weekly screenings.

432 Film History II (4)

Prereq: 201 or 202. (winter) Studies in the history of international silent and sound documentary film. Weekly screenings.

433 Film History III (4)

Prereq: 201 or 202. Studies in the history of international silent and sound experimental film. Weekly screenings.

444 Media Certs Management (4)

Practical assignments in association with the Athens International Film and Video Festival

451 Film Theory and Criticism I (4)

Prereq: 203. (fall) Introductory survey of classical and contemporary approaches to film theory and criticism. Weekly screenings.

452 Film Theory and Criticism II (4)

Prereq: 451. (winter) Advanced study of classical and contemporary approaches to film theory and criticism. Weekly screenings.

453 Film Theory and Criticism III (4)

Prereq: 452. (spring) Special topics in film theory and criticism, including auteurism, structuralism, formalism, and feminism. Weekly screenings.

461 Motion Picture Production I (5)

Prereq: Honors Tutorial College Film major. (fall) Professional 16mm film production. Instruction in basic camera and lighting technique, elementary film structure, and bench editing leading to production of individual silent film projects.

462 Motion Picture Production II (5)

Prereq: Honors Tutorial College Film major. (winter) Continuation of 361 introducing sound motion picture shooting and editing techniques, A and B roll preparation.

463 Motion Picture Production III (5)

Prereq: Honors Tutorial College Film major. (spring) Continuation of 362. Advanced sound motion picture production techniques.

471 Film Topics Seminar (1-5)

Prereq: perm. (fall) Investigation of selected motion picture topic announced in advance of registration. Focus may be scholarly/critical, industry related, or aspect of motion picture production or screenwriting. Topics and credit hours vary.

472 Film Topics Seminar (1-5)

Prereq: perm. (winter) See 471 for description.

473 Film Topics Seminar (1-5)

Prereq: perm. (spring) See 471 for description.

490 Individual Production Problems (1-5)

Prereq: perm. Individual production of motion picture. May be repeated.

491 Individual Readings (1-5)

Prereq: perm. Readings and reports on works related to motion pictures. Reading list is selected by student in consultation with faculty member. May be repeated.

492 Independent Study (1-5, max 10)

Prereq: perm. Advanced individual creative or scholarly work in film.

497T Film Tutorial (1-15)

Prereq: Honors Tutorial College Film Major

498T Film Tutorial (1-15)

Prereq: Honors Tutorial College Film Major

499T Film Tutorial (1-15)

Prereq: Honors Tutorial College Film Major

Finance (FIN)**102 Personal Money Management (4)**

Prereq: fr/soph only. How to live better financially. Relation of personal goals to money management in terms of expenditures, savings, and tax considerations. Financial media that serve the individual such as life insurance, savings, securities, and consumer and mortgage credit.

298 Internship (1)

Prereq: perm. Internship experience that provides on-site exposure to general business operations and procedures. Intended for experiences following the freshman year.

301 Fundamentals of Finance (4)

Prereq: ACCT 102 and QBA 201 or PSY 221 or ECON 381 or COMS 301 or GEOG 271 or MATH 251; no credit for COB students. Problems in managing personal finances. Budgeting expenditures and savings. Planning life insurance program, investment in savings accounts, securities, and other financial assets. Use of consumer and mortgage credit. Personal taxes.

310 Foundations of Financial Management (4)

Prereq: ACCT 102, QBA 201 or PSY 221 or ECON 381 or COMS 301 or GEOG 271 or MATH 251; no credit for COB majors. This course introduces the student to the basic principles of short-term and long-term corporate financial management.

325 Foundations of Finance (4)

Prereq: COB and ACCT 102; QBA 201 or PSY 120, 121, or 221 or ECON 381 or COMS 301 or GEOG 271; jr. Role of financial management in business enterprise; financial analysis; planning needs for

short-term and long-term funds; planning for profits; capital budgeting; internal management of working capital and income; raising funds to finance growth of business enterprises.

327 Financial Markets and Institutions (4)

Prereq: FIN 325, jr and perm. Flow of funds and interest-price movements in money and capital markets. Supply of loanable funds and demand for funds in mortgage loan market, consumer credit market, corporate securities markets, and markets for government securities and municipal obligations. Consideration of effects on financial markets of Federal Reserve and Treasury policies.

331 Risk and Insurance (4)

Prereq: jr or sr and perm. Social importance of risk and its place in personal, business, and national life, including principles and methods of handling risk. Special interest in technique of insurance.

341 Investments (4)

Prereq: 325. Principles in determination of investment media for individual and institutional portfolios. Sources of investment information, analysis of financial statements, investment risks and yields. Securities markets and their behavior.

398 Internship (1-4)

Prereq: perm. Internship experience that provides opportunities to learn by participation in day-to-day activities of a business concern for at least four consecutive weeks. Intended for experience following the sophomore year.

410 Personal Financial Planning (4)

Prereq: 325. Introduction to financial planning for individuals. This course will survey the topics of money management, insurance planning, investment planning, retirement planning, and estate planning.

420 Financial Banking Law (4)

Prereq: jr. This course is designed for students seeking to understand the law and policy of banking and financial institutions (bank, thrift, and credit union). The course emphasizes economic, historical, and legal background of financial institutions; the financial institution regulatory process; and consumer laws.

428 Management of Financial Institutions (4)

Prereq: 327 or perm. Analysis of objectives, functions, practices, and problems of financial institutions as viewed by management of these institutions.

436 Life Insurance (4)

Prereq: 331, perm. Fundamental economics of life insurance. Principles and practices of life insurance including types of contracts, group and industrial insurance, and annuities.

437 Personal and Business Financial Planning (4)

Prereq: jr, 331. Basics of IRS as it applies to personal and corporate taxes, as well as completion of form 1040. Information required on advising clients, as well as personal, concerning estate planning, taxes, trusts, gifts, etc., and how to gather information.

440 Group Insurance and Employee Benefits (4)

Prereq: FIN 331. The study of group life insurance, health insurance and pensions; application to "real life" employee benefits; and exposure to guest speakers from the insurance and securities industry.

441 Business Insurance and Estate Cases (4)

Prereq: two from among 436, 437, 439, and 440. A summary course for students in the risk and insurance field. New cases assigned each week requiring presentations in class and written recommendations on selected case studies presented by small student groups. Lectures by practicing professionals from related disciplines (law, accounting, trusts, employee benefits) are scheduled to demonstrate the broad nature of estate planning practice.

442 Security Analysis (4)

Prereq: FIN 341. Equity security analysis using various quantitative and qualitative methods.

444 Risk Management (4)

Prereq: 327 or perm. Description of derivatives markets, trading, and institutions. Text is supplemented by current readings and derivatives trading simulations.

445 Portfolio Management (4)

Prereq: 341, perm. Decision-making processes in management of individual and institutional securities portfolios. Theoretical foundations of portfolio selection and construction. Mode-building and other criteria applicable to selection, risk-return tradeoffs, revision and evaluation of portfolio performance. Applications of computer technology and other quantitative techniques to different aspects of portfolio management.

450 Credit and Lending Principles of Financial Institutions (4)

Prereq: 325. Provides examination of basic functions involved in supplying credit to borrowers by financial institutions. Organizational framework and division aspects of process studied. Significant policy issues and implications covered.

452 Small Business Finance (4)

Prereq: 325. Application of basic financial management techniques to small business environment (100 or fewer employees). Problems faced by persons who start small business and recommendations for alternative solutions to most commonly discovered problems. Micro view, nuts-and-bolts approach used throughout course, but consistent with broad macro overview set of company objectives.

455 International Finance (4)

Prereq: 325. Problems in international finance. Financing international trade and other transactions; foreign exchange market, exchange market, and exchange rates; international payments system. Foreign central banking and current developments in international financing cooperation.

461 Financial Management and Policy (4)

Prereq: 327 and 341, perm. Case study of financial management in business enterprises. Planning current and long-run financial needs, profit planning, allocation of funds, raising funds, dividend policies, expansion and combination, recapitalization and reorganization. *Tier III equivalent course.*

463 Capital Allocation (4)

Prereq: 325, perm. Planning capital outlays. Methods for ranking investment proposals. Theories of financial structure and cost of capital. Approaches to investment decisions under conditions of uncertainty.

465 Mathematical Analysis of Financial Decisions (4)

Prereq: 325, perm. Application of quantitative methods to financial management, with special emphasis on systems approach to evaluating proposed financial decisions.

491 Seminar (3, 4, or 5)

Prereq: perm. Selected topics of current interest in finance area.

497 Independent Research (1-4)

Prereq: perm. Research in selected fields of finance under direction of faculty member.

498 Internship (1-4)

Prereq: perm.

Foreign Languages and Literatures

includes: International Literatures in English and Modern Languages (Introductory Culture and Civilization; Professional Courses)

Chinese (Asian) (CHIN)

111 Elementary Chinese (4)
(fall) Beginning course of 3-qr 1st-yr sequence.

112 Elementary Chinese (4)
Prereq: 111 or equiv. (winter) Continuation of 111.

113 Elementary Chinese (4)
Prereq: 112 or equiv. (spring) Continuation of 112.

169A Spoken Business Chinese (4)

A task-oriented introduction to the basic communicative functions and business terminologies of the Chinese language. Chinese culture and alphabetic Chinese writing will also be introduced; the Chinese character writing system will not be used. Does not satisfy the foreign language requirement.

211 Intermediate Chinese (4) (2C)

Prereq: 113 or equiv. (fall) 1st course of 3-qr intermediate-level sequence.

212 Intermediate Chinese (4) (2C)

Prereq: 211 or equiv. (winter) Continuation of 211.

213 Intermediate Chinese (4) (2C)

Prereq: 212 or equiv. (spring) Continuation of 212.

311 Advanced Chinese (4)

Prereq: 213 or equiv. (fall) Beginning of advanced-level sequence.

312 Advanced Chinese (4)

Prereq: 311 or equiv. (winter) Continuation of 311.

313 Advanced Chinese (4)

Prereq: 312 or equiv. (spring) Continuation of 312.

399 Special Studies in Chinese (1-3)

Prereq: perm. Reading and discussion of arranged assignments in books, periodicals, and tapes on specific topics related to Chinese language and culture.

French (Romance) (FR)

111 Elementary French (4)

Beginning course of 3-qr, 1st-yr sequence. Basic grammatical concepts and patterns. Emphasis on development of reading, listening comprehension, speaking, and writing skills. Basic text and workbook used. Lab required. No credit if 199.

112 Elementary French (4)

Prereq: 111. Continuation of 111. Basic text, workbook, and readings used. Lab required. No credit if 199.

113 Elementary French (4)

Prereq: 112. Continuation of 112. Basic text, workbook, and readings used. Lab required. No credit if 199.

199 French for Review (4)

No CR if 111, 112 or 113. (fall) Preparation for FR 211 for students with some high school French. Review of grammar and vocabulary with intensive practice adapted to college-level expectations and instructional techniques. Emphasis on speaking, listening, reading, and writing. Does not satisfy language or humanities requirements in Arts and Sciences.

211 Intermediate French (4) (2C)

Prereq: 113 or 2 or 3 yrs h.s. French. 1st course of 3-qr intermediate-level sequence. Intensive review of grammar. Additional readings with discussion in French. Supplemental cultural material.

212 Intermediate French (4) (2C)

Prereq: 211 or perm. Continuation of 211.

213 Intermediate French (4) (2C)

Prereq: 212 or 4-5 yrs h.s. French. Reading and discussion of selected modern works. Completion of 213 fulfills foreign language requirement of College of Arts and Sciences.

298 Independent Study in French (1-2, max 6)

Prereq: 213 or perm. Reading and discussion of assigned materials (books, periodicals, films, tapes) on specific topics involving French language. Does not count toward major or minor. Does not satisfy language requirement.

341 Advanced Conversation and Composition (4)

Prereq: 213 or perm. Speaking and writing based on readings and assigned topics. Grammar review.

342 Advanced Conversation and Composition (4)

Prereq: 341 or perm. Continuation of 341.

343 Advanced Conversation and Composition (4)

Prereq: 342 or perm. Continuation of 342.

345 French for Business (4)

Prereq: 343. Profession-oriented language and culture training in French. Reading, writing, listening, and speaking skills are emphasized in a business context.

348 French Civilization and Culture (4)

Prereq: 341 or 342 or 343. Social, political, and cultural history of France from Middle Ages to Revolution. Readings, discussions, class reports, and short papers.

349 French Civilization and Culture (4)

Prereq: 341 or 342 or 343. (spring) Continuation

of 348, covering 1799 to present. France in the modern world.

354 Introduction to Reading French Literature (4)

Prereq: 341 or 342 or 343. Designed to prepare students to meet the challenges of advanced literature courses. Close reading techniques will enable students to read modern French works with speed and comprehension. Basic aspects of literary analysis and theory will be emphasized.

355 Introduction to Prose (4)

Prereq: 354. Reading and discussion of French novels, short stories, and other narrative genres representing various literary traditions.

356 Introduction to Drama and Poetry (4)

Prereq: 354. Reading and discussion of French drama, as literary text and theatrical performance, and lyric poetry from several historical periods.

396 Internship in French (1-5)

Prereq: perm of internship director. Practice using the language in a work environment. Does not count for major.

415 French Literature of the Renaissance (4)

Prereq: 354; 355 or 356. Major 16th-century poets, including Du Bellay and Ronsard.

416 French Literature of the Renaissance (4)

Prereq: 354; 355 or 356. Major 16th-century prose writers, including Rabelais and Montaigne.

418 17th-Century French Literature (4)

Prereq: 354; 355 or 356. Works by numerous authors, including at least some of the following: Descartes, Pascal, La Fayette, La Rochefoucauld, La Bruyère, La Fontaine, and Boileau.

419 17th-Century French Literature (4)

Prereq: 354; 355 or 356. Major plays of Corneille, Racine, and Molière.

423 18th Century (4)

Prereq: 354; 355 or 356. French literature and thought in Age of Enlightenment.

424 18th Century (4)

Prereq: 354; 355 or 356. Continuation of 423.

425 Romanticism (4)

Prereq: 354; 355 or 356. Romanticism in drama, poetry, and fiction of first half of 19th century.

426 Realism and Naturalism (4)

Prereq: 354; 355 or 356. Major fictional works of 19th century.

427 French Poetry in the Second Half of the 19th Century (4)

Prereq: 354; 355 or 356. Poetry of Baudelaire, Verlaine, Rimbaud, Mallarmé, and others.

429 20th-Century French Literature I (4)

Prereq: 354; 355 or 356. French prose fiction before WWII.

431 20th-Century French Literature II (4)

Prereq: 354; 355 or 356. French prose fiction since WWII.

433 20th-Century French Literature III (4)

Prereq: 354; 355 or 356. French drama of the 20th century.

434 French Through Film (4)

Prereq: 342. Early development of the French cinema and its more recent filmmakers, actors, and actresses. Films are studied in their cultural and historical contexts. Students increase their French proficiency through listening, speaking, reading, and writing.

435 Proseminar (1-4, max 12)

Prereq: 354; 355 or 356. Subject will vary. May be repeated when subject changes.

437 Applied Phonetics (4)

Prereq: 343 or perm. (fall) Systematic study of segmental and prosodic elements of French pronunciation including extensive oral practice.

439 Modern French Usage (4)

Prereq: 343 or perm. (winter) Fine points of grammar. Practice in composition and analysis of texts.

440 Teaching French: Theory and Practice (4)

Prereq: 343. Provides an introduction to current theories about learning and teaching modern foreign languages, with a focus on

the particularities of teaching French language and cultures; opportunities to apply that theoretical knowledge to classroom teaching; and opportunities to develop a deeper knowledge of and more proficiency in French language and cultures. Does not count for major.

441 Stylistics and Criticism (4)

Prereq: 343 or perm. (spring) Composition. Explication de texte. Translation of English into French. Study of French prosody.

454 Francophone Literature of Sub-Saharan Africa, Maghreb, and the Caribbean (4)

Prereq: 355 or 356. Representative works by 20th century Francophone Sub-Saharan, Maghreb, and Caribbean writers, including at least, but not limited to, Malika Mokeddem, Leopold Senghor, Ferdinand Oyono, Maryse Conde, and Simone Schwartz-Bart. Works are studied in their historical and cultural contexts. Readings, lectures, films, and discussions.

464 Francophone Literature of Quebec (4)

Prereq: 355 or 356. Representative works by 20th century writers of Quebec including at least, but not limited to, Anne Hébert, Roch Carrier, Michel Tremblay, Marie-Claire Blais, and Yves Beauchemin. Works are studied in their historical and cultural contexts. Readings, lectures, films, and discussions.

498 Independent Study in French (1-2, max 4)

Prereq: 8 credits at 300 level or perm of dept chair. Directed individual readings, discussion, and reports in language at advanced level. Does not count toward 400-level hrs required for major. Maximum of two credits may count toward minor.

German (Germanic) (GER)

111 Elementary German (4)

Introduction to pronunciation and basic grammar. Development of comprehension and speaking skills. Beginning course of 3-qr 1st-yr sequence.

112 Elementary German (4)

Prereq: 111. Continuation of 111.

113 Elementary German (4)

Prereq: 112. Continuation of 112. Continued development of skills of oral and written production and comprehension.

211 Intermediate German (4) (2C)

Prereq: 113 or 2 or 3 yrs h.s. German. Continued development of listening comprehension, reading, writing, and speaking skills. Grammar review. Lab required. 1st course of 3-qr intermediate-level sequence.

212 Intermediate German (4) (2C)

Prereq: 211 or perm. Continuation of 211. Emphasis on discussion of modern texts. Continued development of listening comprehension and speaking and writing skills. Lab required.

213 Intermediate German (4) (2C)

Prereq: 212 or 4-5 yrs h.s. German. Modern German texts are read and form basis for discussions and written assignments. Completion of 213 fulfills foreign language requirement of College of Arts and Sciences.

235 German Drama on Stage (1-4)

(winter) Presentation of German drama on stage. Private coaching in pronunciation and inflection of German. Credit varies according to role of student. May be repeated for credit with perm.

298 Independent Study in German (1-2, max 6)

Prereq: 213 or perm. Reading and discussion of assigned materials (books, periodicals, films, tapes) on specific topics involving German language. Does not count toward major or minor. Does not satisfy language requirement.

341 Advanced Conversation and Composition (4)

Prereq: 213 or perm.

342 Advanced Conversation and Composition (4)

Prereq: 341 or perm.

343 Advanced Conversation and Composition (4)

Prereq: 342 or perm.

345 Business German (4)

Prereq: 342. Development of the student's linguistic abilities in German in a business context.

Readings, videos, and discussions will focus on business terminology and practices in German-speaking countries. Written assignments include preparing a resume and a letter of application in German.

348 German Culture and Civilization (4)

Prereq: 213 or perm. Historical, intellectual, and artistic aspects of German, Austrian, and Swiss culture from earliest times to present.

349 German Culture and Civilization (4)

Prereq: 213 or perm. Continuation of 348.

355 Introduction to German Literature (4)

Prereq: 341 or perm. Study of major literary works, with emphasis on 18th and 19th centuries.

356 Introduction to German Literature (4)

Prereq: 341 or perm. Study of major literary works of 20th century.

396 Internship in German (1-5)

Prereq: perm of internship director. Practice using the language in a work environment. Does not count for major.

425 19th-Century German Literature (4)

Prereq: 355 and 356.

426 19th-Century German Literature (4)

Prereq: 355 and 356.

427 19th-Century German Literature (4)

Prereq: 355 and 356.

429 20th-Century German Literature (4)

Prereq: 355 and 356.

430 20th-Century German Literature (4)

Prereq: 355 and 356.

431 20th-Century German Literature (4)

Prereq: 355 and 356.

433 German Lyric Poetry (4)

Prereq: 355 and 356. Interpretative and critical study of German lyric poetry.

435 Proseminar (1-4, max 12)

Prereq: perm. Intensive analysis of major author, literary genre, or theme. When subject is changed, student may re-enroll.

439 Grammatical Structure (4)

Prereq: 343 or perm. Selected problems in analysis and classroom presentation of German morphology and syntax.

441 Stylistics (4)

Prereq: 343 or perm. Advanced writing and stylistic analysis. Practice in variety of nonfiction prose techniques.

453 The Age of Goethe (4)

Prereq: 355 and 356. Major works of Lessing, Schiller, and Goethe.

454 The Age of Goethe (4)

Prereq: 355 and 356. Continuation of 453. See 453 for description.

455 The Age of Goethe (4)

Prereq: 355 and 356. Continuation of 453 and 454. See 453 for description.

498 Independent Study in German (1-2, max 4)

Prereq: 8 credits at 300 level or perm of dept chair. Directed individual readings, discussion, and reports in language at advanced level. Does not count toward 400-level hrs required for major. Maximum of two credits may count toward minor.

Greek (GK)

111 Beginning Greek (4)

Grammar, vocabulary, and reading of ancient Greek. Students will be introduced to Ionic, Attic, and Koine (New Testament) dialects.

112 Beginning Greek (4)

Prereq: 111. Continuation of 111. See 111 for description.

113 Beginning Greek (4)

Prereq: 112. Continuation of 111-112. See 111 for description.

211 Greek Prose and Poetry (4) (2H)

Prereq: 113. Review of language principles. Readings adapted to needs and interests.

212 Greek Prose and Poetry (4) (2H)

Prereq: 211. Continuation of 211. See 211 for description.

213 Greek Prose and Poetry (4) (2H)

Prereq: 212. Continuation of 211-212. See 211 for description.

251X Demotic Greek (4)

Beginning demotic (modern) Greek.

252X Demotic Greek (4)

Prereq: 251X. Continuation of demotic (modern) Greek.

253X Demotic Greek (4)

Prereq: 252X. Continuation of demotic (modern) Greek.

311 Greek Epic Poets (4)

Readings in Greek from Homer and Hesiod.

312 Greek Tragedy (4)

Readings in Greek from Aeschylus, Sophocles, and/or Euripides.

313 Readings in Greek Intellectual History (4)

Readings in Greek from Plato, Thucydides, and/or the Sophists.

314 Greek Historians (4)

Readings in Greek from Herodotus and Thucydides.

315 Greek Comedy (4)

Readings in Greek from Aristophanes.

313 Readings in Greek Intellectual History (4)

Readings in Greek from Plato, Thucydides, and/or the Sophists.

314 Greek Historians (4)

Readings in Greek from Herodotus and Thucydides.

315 Greek Comedy (4)

Readings in Greek from Aristophanes.

316 The Greek New Testament and the Milieu of Early Christianity (4)

Readings in Greek from the New Testament, the early Greek fathers, and/or non-Christian writers of interest for the study of early Christianity.

409 Advanced Greek Readings (2-4, max 18)

Prereq: 21 hrs. (on demand) Selections adapted to needs and interests.

Indonesian/Malaysian (Asian) (INDO)

111 Elementary Indonesian/Malaysian (4) (fall) Beginning course of 3-qr 1st-yr sequence.

112 Elementary Indonesian/Malaysian (4) Prereq: 111 or equiv. (winter) Continuation of 111.

113 Elementary Indonesian/Malaysian (4) Prereq: 112 or equiv. (spring) Continuation of 112.

211 Intermediate Indonesian/Malaysian (4) (2C)

Prereq: 113 or equiv. (fall) 1st course of 3-qr intermediate-level sequence.

212 Intermediate Indonesian/Malaysian (4) (2C)

Prereq: 211 or equiv. (winter) Continuation of 211.

213 Intermediate Indonesian/Malaysian (4) (2C)

Prereq: 212 or equiv. (spring) Continuation of 212.

311 Advanced Indonesian/Malaysian (4)

Prereq: 213 or equiv. (fall) Beginning of advanced-level sequence.

312 Advanced Indonesian/Malaysian (4)

Prereq: 311 or equiv. (winter) Continuation of 311.

313 Advanced Indonesian/Malaysian (4)

Prereq: 312 or equiv. (spring) Continuation of 312.

399 Special Studies (1-3, max 9)

Prereq: perm. Independent study of topic of interest in Indonesian/Malaysian language or literature.

International Literatures in English (ILL/ILML)

The lectures and readings for these courses are in English and are aimed at the entire University community. While they do not fulfill requirements toward any of the majors in foreign language, these courses will count toward the humanities area requirements of the College of Arts and Sciences. No credit is counted toward the foreign language requirement.