

**Descriptions – Electrical Engineering and Systems Sciences  
of  
Courses**

**820. System Dynamics and Control**  
Spring. 4(4-0) MTH 215; knowledge of matrices and Laplace transforms.

Fundamentals of continuous and discrete dynamic control systems; feedback principles; transform and state variable design techniques; introduction to optimal control design.

**826. Linear Concepts in Systems Science**

Fall. 4(4-0) Approval of department.

State-space and frequency domain models of interconnected systems; solution of continuous and discrete-time linear systems; response characteristics; stability.

**827. Nonlinear Concepts in Systems Science**

Winter. 4(4-0) SYS 826.

Existence, uniqueness and stability in nonlinear systems; autonomous systems and the phase space; linearization, perturbation, describing functions and harmonic balance procedures; numerical solutions.

**835. Nonlinear Optimization Models**

(828.) Winter, Summer. 4(4-0) Students may not receive credit for both SYS 835 and MGT 835, CHE 465 or MGT 834 or knowledge of linear programming. Interdepartmental and jointly administered with the Department of Management. Interdepartmental with the Department of Chemical Engineering.

Nonlinear optimization-examples and applications. Kuhn-Tucker Theory. Saddle point optimality conditions. Algorithms for problems with constraints. Unconstrained optimization; introduction to search methods.

**841. Optimization of Urban Traffic Flow**

Fall of odd-numbered years. 3(3-0) Approval of department. Interdepartmental with Civil Engineering.

Traffic flow models used in design of computerized traffic control systems. Optimal freeway ramp metering algorithms. Offline and online optimization of traffic signal timing.

**843. Ecosystem Analysis, Design and Management**

Spring. 3(3-0) SYS 442 or ZOL 404. Interdepartmental with the Department of Zoology.

Groups of students from various biological and nonbiological disciplines will synthesize and analyze models of selected biological systems. Project should yield information relevant to solution of contemporary ecological problems.

**851. Modeling of Engineering Systems**

Fall. 4(4-0) M E 458 or E E 415. Interdepartmental with and administered by the Department of Mechanical Engineering.

Modeling of engineering devices and components; assembly into systems; bond graph representation; prediction of dynamic behavior by linear, nonlinear and simulation methods; applications to mechanical, electrical, fluid, thermal systems.

**899. Research**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**961. Optimal Control Theory I**

Fall. 3(3-0) SYS 827, SYS 835 or approval of department; MTH 426.

Formulation of the general control problem; controllability, observability and normality in discrete-state and continuous-state systems; performance functionals; typical control problems.

**962. Optimal Control Theory II**

Winter. 3(3-0) SYS 961 or approval of department.

Optimum control theory in continuous-state and discrete-state systems; necessary and sufficient conditions for optimal solutions, geometric interpretations relation to calculus of variations; typical applications.

**963. Optimal Estimation and Control Theory**

Spring. 3(3-0) SYS 962 or E E 847 or approval of department.

Techniques of optimal control and communication theory; development of stochastic control and detection models, state estimation, Kalman filtering, stochastic control, computational methods.

**999. Research**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**ENGINEERING EGR  
College of Engineering**

**125. Orientation to Engineering Careers**

Winter. 2(2-0)

Engineering careers, history and philosophy of engineering profession, present and future challenges, industrial job functions, employment trends.

**160. Engineering Communications**

Fall, Winter, Spring. 4(1-6) MTH 108 or MTH 111 or concurrently.

Engineering graphics, a means used by engineers to communicate their ideas to others. Freehand sketching, descriptive geometry, and graphical, numerical and computer problem solutions.

**161. Mechanical Drawing**

Fall, Winter, Spring. 2(0-4)

Lettering and use and care of instruments. Orthographic projection, working drawings, machine sketching and isometric drawing.

**162. Mechanical Drawing**

Fall, Winter, Spring. 2(0-4) EGR 160 or EGR 161.

Continuation of EGR 161 with emphasis on freehand lettering and sketching, advanced working drawings.

**200. Technology and Society**

Winter. 3(3-0) Twelve credits of Natural Science. Interdepartmental with the Department of Natural Science.

An attempt to describe and analyze portions of current technology and its desired and undesired consequences; an exploration of avenues for assessing such consequences for future technologies.

**201. Introduction to Engineering Mechanics**

Winter. 4(4-0) PHY 237. Interdepartmental with and administered by the Department of Metallurgy, Mechanics and Materials Science.

Laws of mechanics governing the behavior of rigid and deformable bodies emphasizing how these laws influence engineering design. Extensive use of demonstrations.

**IDC. Introduction to Environmental Systems**

For course description, see Interdisciplinary Courses.

**260. Engineering Drawing**

Fall, Winter, Spring. 3(0-6)

The development of the ability to communicate graphically, pictorially, and orally. Orthographic projection, freehand sketching, oral reports and creative problem solving techniques are employed to enhance learning.

**267. Architectural Drafting I**

Fall, Winter, Spring. 3(0-6)

House construction detailing. Analysis and drawing of typical standard details.

**270. Computer Graphics**

Spring. 3(3-0) EGR 160 or EGR 161; CPS 110 or CPS 120; or approval of department.

Use of computer controlled display systems for the solution of multidimensional problems.

**300. Technology and Utilization of Energy**

Winter. 3(3-0) Initial course in any sequence of courses in the Department of Natural Science. Interdepartmental with and administered by the Department of Mechanical Engineering.

Problems of energy technology and its impact: energy sources, conversions, waste and environmental effects, future outlook for mankind.

**322. Interior Lighting Design**

Fall, Spring. 3(2-2) HED 213; approval of department. Interdepartmental with and administered by the Department of Human Environment and Design.

The basic principles and practices of interior design lighting, light control, distribution, quality and quantity of light as it affects man's near environment.

**364. Architectural Drafting II**

Winter. 3(0-6) EGR 267.

Functional and standard procedure in the layout of floor plans in traditional and modern houses. Rendered plot plan and required details.

**365. House Planning**

Fall, Winter, Spring. 3(1-4)

Elementary house architecture. Drawing plans from sketches. Kitchen planning, house styles, elements of design, financing, heating, lighting.

**366. Architectural Perspective Drawing**

Fall. 3(0-6) Any engineering graphics course.

One-point and two-point perspective, revolved plan and measuring line methods. Pencil rendering, problems in shade and shadows. House model to scale, optional.

**390. Value Engineering**

Fall, Winter. 4(3-2) M E 280.

The basis of value engineering is function, value, and a group of special techniques developed to aid in isolating and identifying problems created by our complex society and technology.

**401. Technology Assessment**

Spring. 3(3-0) Seniors or approval of department. Interdepartmental with the Department of Natural Science.

Sociotechnical evaluation of impact of proposed technologies on economic, political, and cultural aspects of society. Identification of technical strategies and social goals. Techniques of assessment.

**410. Systems Methodology**  
Winter. 3(3-0) IDC 201, MTH 113, CPS 110 or CPS 120. Interdepartmental with and administered by Systems Science.  
The systems approach in multidisciplinary large scale problem solving. The development of useful systems analysis tools; systems design; feasibility study; computer simulation for feasibility evaluation.

**411. Systems Project**  
Spring. 2(3-0) SYS 410. Interdepartmental with and administered by Systems Science.  
Completion of a system study initiated in SYS 410. The project may involve the design of hardware, simulation of a solution to an interdisciplinary problem, or development of a solution concept.

**463. Architectural Drafting III**  
Spring. 3(0-6) EGR 364, or EGR 365.  
Traditional and modern elevations. One- and two-point rendered perspective. Functional plans drawn in EGR 364 or EGR 365 required.

**480. Special Problems**  
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 8 credits. Approval of department.

**ENGLISH** **ENG**  
**College of Arts and Letters**

**091. English for Foreign Students—Structures**  
Fall, Winter, Spring, Summer. Zero credits. (3(5-0) See page A-2 item 3.) English language proficiency examination.  
Explanation and intensive practice of basic grammatical structures of English. Students are tested and then placed in small groups, from beginning to advanced, depending on their need.

**092. English for Foreign Students—Speaking and Listening**  
(092A.) Fall, Winter, Spring, Summer. Zero credits. (3(5-0) See page A-2 item 3.) English language proficiency examination.  
Intensive speaking and listening practice of spoken English in small groups (determined by proficiency). For beginners, practice is largely drill. Advanced groups use drill, films, discussion, and practical conversations.

**093. English for Foreign Students—Language Laboratory**  
Fall, Winter, Spring, Summer. Zero credits. (3(5-0) See page A-2 item 3.) English language proficiency examination.  
Language laboratory practice in small groups (determined by proficiency). Beginnings review and supplement ENG 091, ENG 092. Advanced groups use carefully prepared lectures, speeches, and presentations to practice structures and vocabulary.

**094. English for Foreign Students—Reading**  
Fall, Winter, Spring, Summer. Zero credits. (3(5-0) See page A-2 item 3.) English language proficiency examination.  
Intensive and extensive reading in small groups (determined by proficiency). Beginners emphasize vocabulary development and practice in basic structures. Advanced classes include reading skills, wider reading, and specialized vocabulary.

**095. English for Foreign Students—Writing**  
(092B.) Fall, Winter, Spring, Summer. Zero credits. (3(5-0) See page A-2 item 3.) English language proficiency examination.  
Frequent controlled and free writing in small groups to reduce errors and practice using structures and vocabulary to express ideas. Advanced classes include writing styles used in academic course work.

**101. Responses Through Writing**  
Fall. 4(4-0) Arts and Letters Freshmen only. Students must enroll in and complete ENG 102 satisfactorily to make a substitution for the American Thought and Language requirement.  
A writing workshop that concentrates on the student's personal writing voice and on his responses to the things, people, and institutions central to his experience.

**102. Writing and Composing**  
Winter. 5(5-0) ENG 101; Arts and Letters Freshmen only.  
A continuation of ENG 101 that develops the emphases of ENG 101 and encourages students to write in more public and objective forms—narrative, critical analysis, and issue-oriented essays.

**104. Writing for Science Majors**  
Fall. 3(3-0) Satisfactory grade in English proficiency exam or in Comprehensive English; College of Natural Science majors.  
Writing workshop for science students that develops and refines composition ability. Approved through Summer 1980.

**105. The Scientist as Writer**  
Winter. 3(3-0) ENG 104.  
Study of various types of writing by scientists—fiction, poetry, and autobiography as well as professional papers and books. Students will write frequently about the readings. Approved through Fall 1980.

**106. Introductory Scientific Writing**  
Spring. 3(3-0) ENG 105.  
Writing of popular essays, scientific papers and reports, and other papers related to science. Approved through Winter 1981.

**126. The Writer and Literature**  
Fall, Winter, Spring. 3(3-0) The first term of ATL 121 or above or ENG 101.  
Modern literature from the writer's perspective. Students also write their own critical and creative work, using journal method.

**200H. Honors Work**  
Fall, Winter, Spring. 1 to 16 credits. Approval of department.

**201. Nature of Language**  
Fall, Winter, Spring, Summer. 3(3-0)  
Various aspects of language—phonology and orthography; morphology, semantics and the lexicon; syntax; and dialects—with special reference to American English.

**205. Introduction to Shakespeare**  
Fall, Winter, Spring. 3(3-0) Not applicable to major or minor requirements.  
A study of selected plays illustrating the powers of England's greatest writer.

**206. Forms of Literature: Fiction**  
Fall, Winter, Spring, Summer. 3(3-0) Open to Freshmen.  
Major forms of prose fiction, designed to reveal artistic problems met and solved by these forms. Prepares students for advanced literary study by acquainting them with the conventions of various literary forms, by providing a critical vocabulary and by furnishing experience in reading and writing critical evaluations of outstanding literary works from all historical periods.

**207. Forms of Literature: Drama**  
Fall, Winter, Spring, Summer. 3(3-0) Open to Freshmen.  
Major forms of drama, designed to reveal artistic problems met and solved by these forms.

**208. Forms of Literature: Poetry**  
Fall, Winter, Spring, Summer. 3(3-0) Open to Freshmen.  
Major forms of poetry, designed to reveal artistic problems met and solved by these forms.

**210. Introduction to the Study of Literature I**  
Fall, Winter. 4(4-0) English majors or prospective English majors.  
Exploration of the major forms of literature, the aims and process of literary study, the cultural and personal functions of literature, and the role of literary study in the University.

**211. Introduction to the Study of Literature II**  
Winter, Spring. 4(4-0) ENG 210.  
A continuation of ENG 210.

**213. Writing Workshop**  
Fall, Winter, Spring, Summer. 3(3-0)  
A writing workshop designed to help students improve their writing abilities. The course provides opportunities for students to write with different purposes in a variety of modes.

**214. Composition for Secondary English Teachers**  
Fall, Winter, Spring. 4(3-4) Sophomore English Education majors or written approval of department.  
Writing practice in various modes such as personal narrative and description, the familiar essay, drama, poetry, and fiction. Exercises in creative dramatics. Discussion of the process of composing and the teaching of oral and written composition in junior and senior high schools. Will participate in field experience.

**220. English from Greek and Latin Roots**  
Fall. 3(3-0) Interdepartmental with and administered by Classical Languages.  
Prefixes, roots, suffixes derived from Greek and Latin word elements used in formation of English words. Useful for improving vocabulary and spelling.

**226. Introduction to Creative Writing**  
Fall, Winter, Spring. 4(4-0) The first term of ATL 121 or above or ENG 101.  
Writing of fiction, drama, creative nonfiction, and poetry, with ample practice in several. Some reading of professional contemporary writing. Course organized as workshop, designed for beginning writers.

**228A. Fiction Writing**  
Fall, Winter, Spring, Summer. 4(4-0) Written approval of instructor.  
The writing of short fiction. Classes and individual conferences. Approval to enroll requires a conference with the instructor and will usually be on the basis of manuscripts submitted to him.