848. Communication Theory
Spring. 3(3-0) E E 847, E E 880, E E 885. Interdepartmental with and administered by Electrical Engineering.
Hypothesis testing, decision theory and parameter estimation in communications and signal processing. Optimal filtering techniques. Communication in non-Gaussian noise. Quantum detection theory.

851. Modeling of Engineering Systems I
Fall. 3(3-0) M E 458 or E E 415. Interdepartmental with and administered by the Department of Mechanical Engineering.
Modeling of engineering components and dynamic systems: mechanical, electrical, fluid, thermal, and transducer effects. Linear state-space responses, impedance methods. Simulation of linear models. Design project.

852. Modeling of Engineering Systems II
Winter. 3(3-0) M E 551. Interdepartmental with and administered by the Department of Mechanical Engineering.

863. Analysis of Stochastic Systems

880. Signal Analysis
Winter. 3(3-0) Approval of department. Interdepartmental with and administered by Electrical Engineering.

899. Master's Thesis Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

947. Topics in Communications
Fall of odd-numbered years. 3(3-0) May be repeated for a maximum of 8 credits. E E 848. Interdepartmental with and administered by Electrical Engineering.
Advanced treatment of a topic or group of topics of current research interest in the field of communications, information theory and signal processing.

961. Optimal Control Theory
Fall. 3(3-0) SYS 827, MTH 426. Optimal control, performance measures, principle of optimality, dynamic programming. Hamilton-Jacobi-Bellman equation, variational approach, constrained extrema, Pontryagin principle, necessary conditions, solution techniques, singular cases.

962. Computational Techniques for Optimal Control
Winter of odd-numbered years. 3(3-0) SYS 861. Computational methods of optimal controls, steepest descent, variation of extremals, quasilinearization, gradient projection, dynamic programming, convexity techniques, support functions for reachable sets, current literature.

963. Dynamic System Identification and Control
Spring of odd-numbered years. 3(3-0) SYS 863. SYS 829. System identification; dynamic programming; adaptive and control. Topics under identification include review of statistics background, dynamic system models, identification methods, recursive algorithms, input design, and structure discrimination.

964. Large Scale Dynamic Systems
Winter of even-numbered years. 3(3-0) SYS 901. Model simplification; stability of large scale systems; decentralized control; optimization by decomposition and coordination; multilevel hierarchical control; applications.

999. Doctoral Dissertation Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

ENGINEERING EGR

College of Engineering

1255. Orientation to Engineering Careers
Winter. 2(2-0) Credits earned in this course are included in computation of GPA and MAPS but are not included in the 180 credits required for graduation. Engineering careers, history and philosophy of engineering profession, present and future challenges, industrial job functions, employment trends.

200. Technology, Society and Public Policy
Winter. 3(3-0) Twelve credits from natural science or engineering. Interdepartmental with the Department of Natural Science. Description and analysis of certain current technologies and their consequences; exploration of avenues for assessing such consequences as an aid to formulation of public policy.

290. Selected Topics
Fall, Winter, Spring, Summer. 1 to 3 credits. May be repeated for a maximum of 8 credits if different topics are taken. Experimental course developments or special topics appropriate for freshmen and sophomores.

344. Engineering Cooperative Education
Fall, Winter, Spring, Summer. Zero credits. [3 credits—See page A-1, item 3.] May be repeated for a maximum of six terms. Employment assignment approved by College of Engineering. Pre-professional employment in industry and government related to student's major.

390. Value Engineering
Fall, Winter, Spring. 4(4-0) MMM 280 or approval of department.
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. Engineering and Public Policy
Spring. 3(3-0) Seniors or approval of department. Interdepartmental with the Department of Natural Science. Sociotechnical assessment of impact of technology on society, with analysis of the role of engineering and natural science in contributing to public policy formulation.

English — Descriptions of Courses

ENG College of Arts and Letters

091. English for Foreign Students—Structures
Fall, Winter, Spring, Summer. Zero credits. [See page A-1, 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
Fall, Winter, Spring, Summer. Zero credits. [See page A-1, 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. [See page A-1, item 3.] English language proficiency examination.
Language laboratory practice in small groups (determined by proficiency). Begins 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. [See page A-1, item 3.] English language proficiency examination.
Intensive and extensive reading in small groups (determined by proficiency). Emphasizes vocabulary development and practice in basic structures. Advanced classes include reading skills, wider reading, and specialized vocabulary.

095. English for Foreign Students—Writing
Fall, Winter, Summer. Zero credits. [See page A-1, 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. Must enroll in and complete ENG 101 satisfactorily to make a substitution for the American Thought and Language requirement. A writing workshop that concentrates on the students' personal writing voice and on their responses to the things, people, and problems central to their experience.