EECS 160A INTRODUCTION TO CONTROL SYSTEMS
(Required for EE)

Catalog Data:	**EECS 160A Introduction to Control Systems (Credit Units: 4)** Modeling, stability, and specifications of feedback control systems. Root locus, Bode plots, **frequency domain design**, Nyquist criteria, and state-space methods for dynamic analysis and design. Corequisite: EECS160LA. Prerequisites: EECS10, CEE10, or MAE10; EECS170B, EECS170LB; EECS150A. Formerly ECE140A. (Design units: 2)
Textbook:	Franklin, G., Powell, J. D., & Emami-Naeini, A., *Feedback Control of Dynamic Systems,* Pearson Higher, ISBN: 0-13-032393-4.
References:	
Coordinator:	Keyue M. Smedley
Course Objectives:	Analyze, design, and test a single input single output control system.
Course Outcomes:	Students will: **Model a physical system using Laplace transfer functions** **Present and analyze control systems using block diagrams,** **Predict system dynamic response for the transfer functions (zeros/poles)** **Design a system according to pole/zero or Routh tabulation** **Design PID control** **Sketch robot locus** **Design controller using root locus** **Read and draw bode plot** **Understand phase margin and grain margin** **Deign lead compensator and lag compensator**
Prerequisites By Topic:	Understanding of signal and systems and electronic circuits.
Lecture Topics:	Introduction Dynamic Models Dynamic Responses Basic Properties of Feedback Systems The Root-locus Design Method The Frequency-response Design Method
Class Schedule:	Meets for 3 hours of lecture and 1 hour of discussion each week for 10 weeks.
Computer Usage:	MATLAB. Computer lab with MATLAB is requested for the first 3 weeks of class discussion.
Laboratory Projects:	Introduction to **Contol System Emulator** Solving Differential Equations with **an Control system Emulator** DC Motor Modeling and Velocity Control Experiment in Setting the PID Controller

Root-Locus Verification
Identification of an Unknown Process

Professional Component: Contributes toward the Electrical Engineering Topics Courses and Major Design experience.

Relationship to Program Outcomes: This course relates to Program Outcomes a, b and k as stated at: http://undergraduate.eng.uci.edu/degreeprograms/electrical/mission

Design Content Description

Approach: The homework assignments include many design problems, such as physical system modeling, dynamic system analysis, and controller design using frequency domain or root locus design methods.

Lectures: 60%

Laboratory Portion: 40%

Grading Criteria:

Home work:	10%
Midterm exam:	40%
Final exam:	50%
	100%

Estimated ABET Category Content:

Mathematics and Basic Science: 0 credit units or 0%
Engineering Science: 1 credit units or 33%
Engineering Design: 2 credit units or 67%

Prepared by: Keyue M. Smedley **Date:** July 2007

CEP Approved: Fall 2004