
Control Systems

ECE 486
Rouzbeh Touri

Spring 2007
163 EL, MWF, 10-10:50 A.M.

This course is about the analysis and design of control systems with emphasis on modeling, state variable representation, computer solutions, modern design principles, and laboratory techniques.

Lectures

10:00 - 10:50 am, Mon Wed Fri, 163 Everitt Lab. Attendance to the lecture is both recommended and required. There might be a short and easy in-class quiz on days when attendance drops below 60% of the registered students.

Laboratory

The lab sessions will begin on the week of January 20th. Your lab TA will give you detailed information on the lab and describe the policy on lab reports.

Instructor

Rouzbeh Touri, 160 CSL, *touri-at-uiuc.edu* (please put ECE 486 in the beginning of the subject line when e-mailing). Office hours: Monday 1:30-3:00PM, 160 CSL.

Teaching Assistants

Course TA: Erick Rodriguez-Seda, E-mail: *erodrig4-at-uiuc.edu*,
Office hours: Thursday 2:00-3:50PM 369 EL

Laboratory TAs: (Office hour location: 235 EL)

Aaron Becker, E-mail: *abecker5-at-uiuc.edu*, Office hours: Mon, 1:00-3:00PM

Control Systems Lab Manager

Dan Block, E-mail: *d-block-at-uiuc.edu*

Course Webpage

<http://courses.ece.uiuc.edu/ece486>

Homework sets, solutions, and announcements will be posted on the webpage.

Prerequisite

ECE 210 or consent of instructor.

Textbook

The required textbook is *Feedback Control of Dynamic Systems, 5th edition, Prentice Hall, 2006* by Franklin, Powell, and Emami-Naeini.

You should obtain the lab notes from the IEEE office prior to the first meeting of the lab. There is a list of books on reserve at the Grainger Engineering Library is at the end of the syllabus.

Some assignments in the course and labs will require the use of MATLAB. You may use MATLAB in EWS labs; however, it might be convenient to have the Student Edition on your own computer. You can find couple of MATLAB tutorials on the course website.

Homework

Homework will usually be assigned every Friday. It will usually be due the following Friday at the beginning of class. However, follow the in-class and website announcements regarding deadlines and updates. ***No late homework will be accepted.*** You are encouraged to work in groups, share hints, and compare results, but the work you turn in should be your own. Please make your solutions as neat as possible.

Grading

Weekly Homework - 15%, Lab - 30%, Midterm Exams (2) - 15% each, Final - 25%.

Exams

There will be two term exams in addition to the final exam. In the term exams you will be allowed 1 sheet of handwritten notes (letter size; both sides); but otherwise they will be closed-book and closed-notes.

The dates for these exams are:

1st Midterm - 7:00-8:30 PM, Thursday, March 1, Location: TBA

2nd Midterm - 7:00-8:30 PM, Thursday, April 5, Location: TBA

Final - 7:00-10:00 PM, Wednesday, May 9, Location: TBA

Brief Course Outline

- I. Systems and their models, dynamic response (4 weeks) Modeling examples, differential equations, impulse response, transfer functions, poles and zeros, feedback.
- II. Root locus design (3 weeks) Evans' root locus method, dynamic compensation.
- III. Frequency response design (4 weeks) Bode plots, Nyquist stability criterion.
- IV. State space design (3 weeks) Linear pole placement, estimator design.

Reserve Book List

These books are on reserve at the Grainger Engineering Library.

G. F. Franklin, J.D. Powell and A. Emani-Naeini. Feedback Control of Dynamic Systems. Prentice-Hall, 5th edition, 2006

Benjamin C. Kuo. Automatic Control Systems. Prentice Hall, 7th Edition, 1995

R. C. Dorf and R.H. Bishop. Modern Control Systems. 9th Edition, Prentice Hall, 2001

Katsuhiko Ogata. Modern Control Engineering. Prentice Hall, 4th Edition, 2002

Katsuhiko Ogata. Solving Control Engineering Problems with MATLAB. Prentice Hall, 1994

R. H. Cannon, Jr. Dynamics of Physical Systems. McGraw-Hill, 1967

B. Friedland. Control Systems Design: An Introduction to State-Space Methods. McGraw-Hill, 1986

D. K. Frederick and J.H. Chow. Feedback Control Problems Using MATLAB and the Control Systems Toolbox. PWS Publishing Co., 1995