

# EECS128 Introduction to Control Design Techniques

<http://inst.eecs.berkeley.edu/~ee128/>

## Course Outline

Professor C. Tomlin

Department of Electrical Engineering and Computer Sciences, UC Berkeley  
Fall 2008

### Lecture Information

Lectures: TTh 12.30 - 2.00, 237 Cory

Section: TBD

### Contacts

Professor Claire Tomlin

259M Cory

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Office hours: Tu 3-4pm, W 1-2pm.

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253 Cory

### Course Description

Review of root-locus and frequency response techniques for control system synthesis. State-space techniques for modeling, full-state feedback regulator design, pole placement, and observer design. Combined observer and regulator design. Lab experiments on computers connected to mechanical systems.

- Transfer function and state space models for control system analysis and synthesis. Pole locations and relationship to time response. Root locus methods. Stability.
- Feedback. Review of single-input single output (SISO) analysis and control methods in the frequency domain (Bode, Nyquist).
- SISO analysis and control using state space models. The matrix exponential and its relationship to time response. Controllability and observability. Combining state feedback with observers.
- Multi-input multi-output analysis and control using state space models.
- The linear quadratic regulator.

## **Evaluation**

There will be approximately 10 problem sets, and 5 labs.

There will be one midterm, and a final exam. Course Grades: HW (20%); Labs (20%); Midterm (20%); Final (40%)

## **Policies**

It is encouraged that you work in groups, however each person must hand in his/her own homework. The lab will be done in groups, with one lab report per group.

Homework (HW) is due by 4.30pm in Tomlin's mail box in Cory 253. Late homeworks will not be accepted.

## **Mailing List**

It is important that you subscribe to the course mailing list, as updates and class announcements are sent to this list. Subscribe by signing up on the first day of lectures or emailing Tomlin.

## **Course Texts and References**

The course will be based on Lecture Notes which will be made available throughout the quarter. In addition, FPE is the recommended reference text.

(FPE) "Feedback Control of Dynamic Systems, Fifth Edition", Franklin, Powell, Emami-Naeini. Prentice Hall, 2006.

Other references:

"Modern Control Engineering", Ogata. CA TJ213.028 1996.

"Modern Control Systems", Dorf. CA TJ216.D67 1998.

"Linear System Theory and Design", Chen. ISBN: 0195117778 1998.