ME132 Dynamic Systems and Feedback Fall 2013

Website All announcements, homework, solutions will be posted here
https://bspace.berkeley.edu/
Be sure you have access to the class in bspace.

Instructor Xu Chen, *maxchen@berkeley.edu*, 5112 Etcheverry Hall
Office hours: Mon 4pm-5:30pm; Wed 1pm-2:30pm

Teaching Assistants Yizhou Wang, *yzhwang@berkeley.edu*
Office hours: Thur 5pm-6pm in 1165 Etcheverry; Fri 12pm-1pm in 136 Hesse
Eduardo Wiputra, *ewiputra@berkeley.edu*
Office hours: Mon 11am-12pm; Wed 11am-12pm; both in 136 Hesse

Prerequisites Math 1A, 1B, 53, 54, E7.
Some previous exposure to Matrix Algebra will be valuable.
ME 104 or equivalent can be taken concurrently.

Lectures Mon Wed Fri 3pm-4pm, 105 Northgate.

Discussions Starts in the week of Sept. 02.

Sec 1: Mon 12pm-1pm in 2107 Etcheverry
Sec 2: Mon 1pm-2pm in 2107 Etcheverry
Sec 3: Wed 10am-11am in 2107 Etcheverry
Sec 4: Tues 11am-12pm in 2107 Etcheverry

Grading 2 midterms [25% each] + homework [15%] + final [35%]

Text None is required. Notes will be provided for most of the topics covered.

Reference K. Astrom and R. Murray, *Feedback Systems: An Introduction for Scientists and Engineers*, Princeton University Press, Princeton, NJ, 2008.
Newest version available online (free).
On 2-hour reserve at the Engineering Library.

Midterms Closed book and closed lecture notes, handwritten summary sheets are allowed.
Midterm 1: Fri, Oct. 04, 3pm-4pm (in class; one 8.5×11 summary sheet allowed)
Midterm 2: Fri, Nov. 08, 3pm-4pm (in class; two 8.5×11 summary sheets allowed)
Final: Tues, Dec. 17, 7pm-10pm (six 8.5×11 summary sheets allowed)

Homework Homework will be posted on bspace on Fridays and due at *2:00 pm sharp the following Friday. No late homework will be accepted*, but the two lowest homework grades will be dropped.
Homework solutions will be posted on bspace after 4:00 pm on the due date.
Turn in your homework at the Drop Box (labeled *ME 132*) on the 3rd floor of Etcheverry Hall.
Homework will be returned in discussion sessions.

Introduction to Matlab and Simulink sessions

Please be noted that E7 or a comparable Matlab class is a prerequisite. Introduction to Simulink sessions will be offered during the second week of instruction (9/2-9/6) during regular discussion times. You must attend at least one session if you have not used Simulink.

Students with Disabilities

If you need disability-related accommodations in this class, if you have emergency medical information you wish to discuss with the instructor, or if you need special arrangements in case the building must be evacuated, please inform the instructor immediately. Please see the instructor privately after class or in his office.

A Reminder about Academic Integrity

Please be reminded that the ME Department takes academic dishonesty very seriously, and the consequences will be severe for all parties involved. The University's Policy on cheating, from the UCB General Catalog, is given below:

> **Cheating or Plagiarism**
> Achievement and proficiency in subject matter include your realization that neither is to be achieved by cheating. An instructor has the right to give you an F on a single assignment produced by cheating without determining whether you have a passing knowledge of the relevant factual material. That is an appropriate academic evaluation for a failure to understand or abide by the basic rules of academic study and inquiry. An instructor has the right to assign a final grade of F for the course if you plagiarized a paper for a portion of the course, even if you have successfully and, presumably, honestly passed the remaining portion of the course. It must be understood that any student who knowingly aids in plagiarism or other cheating, e.g., allowing another student to copy a paper or examination question, is as guilty as the cheating student.

Tentative Schedule

08/30	the power of feedback; terminology;
09/04;09/06	structure of control systems; block diagrams; major concepts; cruise control example;
09/09-09/13	signals; systems; modeling; first-order systems and their solutions;
09/16-09/20	free response; forced response; general ODE;
09/23;09/27	general LTI systems; transfer function; poles and zeros;
09/30-10/04	stability; steady-state gain; **midterm 1 on 10/04**;
10/07-10/11	second-order systems;
10/14-10/18	arthmetic of feedback loops; complex arithmetic; frequency response;
10/21-10/25	frequency response (continued); Bode plots;
10/28-11/01	goals and fundamental limitations of feedback design; feedforward;
11/04-11/08	PID control; linear algebra review; **midterm 2 on 11/08**;
11/13;11/15	state-space analysis;
11/18-11/22	state-space design; nonlinear systems;
11/25;11/27	equilibrium points; linearization;
12/01;12/04	selected topics: anti-windup; system identification; estimation; adaptation; selected topics (continued); big picture of control engineering;