ME132 Dynamic Systems and Feedback Fall 2019

Website All announcements, homework, solutions, notes will be posted on
https://bcourses.berkeley.edu/
Make sure you have access to this site!

Instructor Kameshwar Poolla, *poolla@berkeley.edu*, 5141 Etcheverry
Office hours: Thursdays, 3:00-4:30 pm; begins Sept. 5th
Location: 5102 Etcheverry

Assistants Office hours (Location: 1171 Etcheverry, begins the week of September 2)

Jinge Wang, *jinge@berkeley.edu*	Tuesday, 4-5 pm
Akhil Shetty, *shetty.akhil@berkeley.edu*	Wednesday, 11:00am-12:00pm
He Yin, *he_yin@berkeley.edu*	Friday, 2:30-3:30pm

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

Lectures MWF 1-2 pm, 105 Northgate.

Labs Labs begin the week of September 2.
You can attend any lab section.

Lab Sec 1: Tu 05:00-06:00 pm	10 Jacobs
Lab Sec 2: Th 09:00-10:00 am	10 Jacobs
Lab Sec 3: Th 02:00-03:00 pm	10 Jacobs
Lab Sec 4: Fri 09:00-10:00 am	10 Jacobs

Grading (tentative plan)
2 midterms [25% each] + homework [15%] + final [25%] + labs [10%]
I may decide to offer a project, in which case the weights will change.

Text None is required. Notes will be provided for *most* of the topics covered.
I strongly suggest you attend lecture and take good notes.

Reference K. Astrom and R. Murray,
Feedback Systems: An Introduction for Scientists and Engineers,
Princeton University Press, Princeton, NJ, 2008.
Available at the Student Store and online (free).

G. F. Franklin, J. David Powell, and A. Emami-Naeini,
Feedback Control of Dynamic Systems,
Prentice-Hall, 6th edition, 2009.
On 2-hour reserve at the Engineering Library.

Exam Dates (Final date is tentative)
Midterm 1: Friday, October 11, 5:00-6:30pm
Midterm 2: Friday, November 15, 5:00-6:30pm
Final: Wed, December 18, 7:00-8:30pm

Announcements, Resources, etc

Announcements, homework assignments, solutions, and course material will be posted on bCourses. The class email list is also controlled through bcourses, so please be sure you have access to bcourses and your current email address is up to date in Bearfacts. Please check the course website frequently for updates.

Piazza

We will use Piazza as the primary means for answering your questions online. Please post questions you may have about lecture material or homework to Piazza instead of emailing GSIs. The GSIs will monitor the website on a regular basis and we'll try our best to answer your questions in a promptly manner. We also rely on you (the students) to help answer questions among yourselves, but please do this in such a way as not to give out the final answer to the homework problem.

Sign-up link: *piazza.com/berkeley/fall2019/meceng132*
Class page link: *piazza.com/berkeley/fall2019/meceng132/home*

Homework

Homework is very important. It is the best way to learn the theory material. Homework will be posted on bcourses on Thursdays and due at *6:00 pm sharp the following Friday.*
We will be using Gradescope to assign and submit homework. You will receive a link via your Berkeley email. Email TAs if you have any issues getting to the ME 132 Gradescope website. For help scanning and submitting homework:
`https://www.gradescope.com/help#help-center-section-student-workflow`.
Late homework will not be accepted under any circumstance. This is because it isn't fair to other students and because the logistics of a 100-student course are formidable. I understand that sometimes you will miss turning in homework, or will be too busy with other classes. So I will simply drop your two lowest homework scores from grade calculations to account for absences, birthdays, bad days, and other realities of life. This means you could miss turning in homework two times without penalty.
Homework solutions will be posted on bcourses after 6:00 pm on the due date.

Exams - 75%

There are three exams. Each is 90 minutes, closed book, closed notes. You will be allowed two two-sided cheat sheets. You may bring a calculator.
Please notify me by email before October 1, 2019 if you will have a DSP accommodation. DSP accommodation requests that I receive at the last minute before exams will not be honored. Please notify me by email if you have a conflict for the midterms.

Cheating Policy

We have a zero tolerance policy towards cheating. We will make seriously efforts to proctor exams closely. Cheating is disrespectful to the vast majority of other students who work hard and honestly represent their own work. The risk just isn't worth it to get a slightly better grade in one course out of many you will take.

Matlab proficiency

Please download and install a free copy of Matlab and Simulink from Software Central.
We assume everyone has taken E7 or a comparable Matlab class.
If you are unfamiliar with the basics of Matlab, make an appointment to meet with a teaching assistant as soon as possible.

Introduction to Simulink sessions

Introduction to Simulink sessions will be offered during the first week of instruction during regular lab times. You must attend at least one session if you have not used Simulink.

Tentative Schedule

Week 1	The power of feedback; terminology, structure of control systems, block diagrams, major concepts.
Week 2	Cruise control example; signals, systems, models, controllers.
Week 3	First order systems; free response, step response, frequency response, transfer functions; control.
Week 4	Second order systems; PID control; anti-wind-up strategies.
Week 5	General LTI systems; transfer functions; stability; frequency response;
Week 6	Interconnected systems; root-locus; Nyquist theorem; delays.
Week 7	Stability robustness and robustness margins
Week 8	Linear algebra review; introduction to state-space
Week 9	Realizations; general solution
Week 10	State-feedback; pole-placement; observers; separation principle.
Week 11	Nonlinear systems; equilibrium points; linearization.
Week 12	Feedback linearization; Gain-scheduling.
Week 13	System identification; estimation; model predictive control; adaptation.
Week 14	New frontiers.