

## EE128/ME134 Feedback Control Systems, Spring 2015

**Instructor:** Prof. Ronald Fearing

Office Hours (725 Sutardja Dai Hall) Mon. 130-230 pm, Thu 2-3 pm, or email [ronf@eecs](mailto:ronf@eecs) for appointment.

**Teaching Assistants:**

Cameron Rose, [c\\_rose@eecs.berkeley.edu](mailto:c_rose@eecs.berkeley.edu), OH: Mon 10-11am, Th. 10-11 am, 125 Cory Hall.  
Deepan R.P. Muthirayan, [mdrpkar@gmail.com](mailto:mdrpkar@gmail.com), OH: Tues. 2-3 pm, Wed. 4-5 pm, 125 Cory Hall.

**Course web page:** <http://www-inst.eecs.berkeley.edu/~ee128/> for handouts, homeworks, lecture notes.

Please use Piazza for class questions: <https://piazza.com/class/i4uu473bnhy4ue>.

**Text:** N.S. Nise, *Control Systems Engineering*, 6<sup>th</sup> edition.

**Recommended Software:** MATLAB & Simulink Student Version 2010a or later. Check <https://software.berkeley.edu/matlab> for availability.

**Grading:** Homework: 15%, Lab 30%, Midterm 20%, Final 35%.

**Homework:** Homework is due Fri 5 pm in the homework box in first floor Cory. The lowest HW grade will be dropped. Up to 2 people may turn in a single homework writeup with both names listed.

**Reader:** Kiet Lam, [kiet.lam@berkeley.edu](mailto:kiet.lam@berkeley.edu)

**Labs:** Scheduled labs will be held in 125 Cory. Due to limited lab stations, groups of 3 (or 4 if needed) students will work together and electronically submit a single Prelab (due before lab) and a single Final Lab Report. For the first lab assignments you will be assigned a group within your assigned lab section. You must attend your assigned lab section. By arrangement only with GSIs, 2 students can request to swap sections with each other.

Section 010: M 2-5 pm, Deepan

Section 011: Tu 3-6 pm, Cameron

Section 012: W 12-3 pm, Cameron

Section 013: F 12-3 pm, Deepan

There are no discussion sections.

**Honest and ethical conduct.** All work submitted to the class must be your own or attributed. The penalty for unethical conduct on exams will a grade of F or NP and a letter will be written to the campus Office of Student Conduct. The penalty for unethical conduct on homework or labs will be a -100% grade on that assignment.

EE128/ME134 Course Schedule (draft 1/18/2015)

[please see class web page for updates]

Wk	#	Date	Lecture	Read.	Hwk	Lab
1	1	Tue 1/20	Overview, intro. to FB control, dynamic models <a href="#">slides</a>	Ch. 1.	HW1 (due 1/30)	no lab
	2	Thu 1/22	Modeling in the frequency domain	Ch. 2.		
2	3	Tue 1/27	Modeling in the time domain <a href="#">slides</a>	Ch. 3.	HW 2 (due 2/6)	no lab
	4	Thu 1/29	Modeling in the time domain			
3	5	Tue 2/3	Time response <a href="#">slides</a>	Ch. 4	HW 3 (due 2/13)	Lab 1: Modeling Simulation in MATLAB / Simulink
	6	Thu 2/5	Time response			
4	7	Tue 2/10	Stability <a href="#">slides</a>	Ch. 6	HW 4 (due 2/20)	Lab 2: Basic concepts in control system design
	8	Thu 2/12	Steady state errors <a href="#">slides</a>	Ch. 7		
5	9	Tue 2/17	Steady state errors		HW 5 (due 2/27)	Lab 3: Quanser hardware & proportional control
	10	Thu 2/19	Root locus techniques <a href="#">slides</a>	Ch. 8		
6	11	Tue 2/24	Design via root locus <a href="#">slides</a>	Ch. 9	HW 6 (due 3/6)	
	12	Thu 2/26	Frequency response techniques	Ch. 10		
7	13	Tue 3/3	Frequency response techniques			Lab 4: Model-based position control of a cart
	14	Thu 3/5	Frequency response techniques			
8	15	Tue 3/10	midterm review		HW 7 (due 3/20)	no lab
	16	Thu 3/12	tentative Midterm: HW1-6, lec 1-14, Ch 1-10, lab 1-4			
9	17	Tue 3/17	Design via frequency response	Ch. 11	HW8 (due 4/3)	Lab 5a Magnetic levitation
	18	Thu 3/19	Design via frequency response			
		3/23-3/27	Spring break			
10	19	Tues 3/31	Design via state space <a href="#">slides</a>	Ch. 12	HW 9 (due 4/10)	Lab 5b: Magnetic levitation
	20	Thu 4/2	Design via state space			
11	21	Tue 4/7	Design via state space		HW 10 (due 4/17)	Lab 6a: Pole placement for the inverted pendulum
	22	Thu 4/9	LQR Design	handout		
12	23	Tue 4/14	LQR Design		HW 11 (due 4/24)	Lab 6b: Luenberger observer design for inverted pendulum
	24	Thu 4/16	PID control	handout		
13	25	Tue 4/21	Digital control systems <a href="#">slides</a>	Ch. 13	HW 12 (due 5/1)	Lab 6c: LQR controller design for inverted pendulum
	26	Thu 4/23	Digital control systems <a href="#">slides</a>			
14	27	Tue 4/28	control with vision systems	handout		Lab 6d: Self-erecting inverted pendulum no lab
	28	Thu 4/30	Course wrap up and review			
		Tue 5/5	<b>RRR Week, No Lecture</b>			no lab
		Thu 5/7	<b>RRR Week, No Lecture</b>			
		Thu 5/14	<b>Final Exam is Thursday 5/14 1510-1800</b>			