University of California at Berkeley
Department of Mechanical Engineering

ME 233: Advanced Control Systems II   **Spring 2014**

ME233 discusses advanced and practical control theories, including but not limited to: Linear Quadratic Optimal Control, Kalman Filter, Discretization, Linear Quadratic Gaussian Problem, Loop Transfer Recovery, System Identification, Adaptive Control and Model Reference Adaptive Systems, Self Tuning Regulators, Repetitive Control, and Disturbance Observers.

Instructor:	Xu Chen, maxchen@berkeley.edu
	Office: 5112 Etcheverry Hall
	Tentative Office Hour: Tu, Th 1:00pm – 2:30pm in 5112 Etcheverry
Teaching Assistant:	Changliu Liu, changliuliu@berkeley.edu
	Office: 2103 Etcheverry Hall
	Tentative Office Hour: TBA
Lectures:	Tu, Th 8:00 am - 9:30 pm in Rm. 3113 Etcheverry Hall
Discussion:	Fri. 10am-11am in Rm 1165 Etcheverry Hall
Prerequisites:	ME C 232 (syllabus on course website) or its equivalence
Course website:	http://www.me.berkeley.edu/ME233/sp14/ and bCourses.berkeley.edu

Grading:		
	Two Midterm Exams (open one-page summary sheet for each exam)	2*20 %
	Final Examination (open notes)	40 %
	Homework (see policy on course website)	20 %

Class Notes:	ME233 Class Notes by M. Tomizuka (Parts I and II)
	They can be purchased at Copy Central, 48 Shattuck Square, Berkeley

Tentative Schedule (Subject to change):

Week	Days	Topics
1	1/21, 1/23	Dynamic Programming, Discrete Time LQ problem, Review of Probability Theory: Sample Space, Random Variable, Probability Distribution and Density Functions.
2	1/28, 1/30	Review of Probability Theory: Random Process, Correlation Function, Spectral Density
3	2/4, 2/6	Principle of Least Squares estimation; Stochastic State Estimation (Kalman Filter).
4	2/11, 2/13	Stochastic Estimation (continuation)
5	2/18, 2/20	Linear Stochastic Control (Linear Quadratic Gaussian (LQG) Problem); Singular values; Introduction to linear multivariable control.
6	2/25, 2/27	Linear multivariable control; Loop Transfer Recovery
7	3/4, 3/6	Tracking Control; Feedforward and preview control; **in-class Midterm I on 3/6/2014**
8	3/11, 3/13	Internal Model Principle and Repetitive Control.
9	3/18, 3/20	Disturbance Observer
	3/25, 3/27	SPRING RECESS
10	4/1, 4/3	System Identification and Adaptive Control
11	4/8, 4/10	Parameter Estimation Algorithms
12	4/15, 4/17	Stability analysis of adaptive systems; **in-class Midterm II on 4/15/2014**
13	4/22, 4/24	Minimum Variance Control, Self-tuning Regulators.
14	4/29, 5/1	Self-tuning Regulators. Robustness of Adaptive Control Systems.

Final Examination: May 15 (Th) 2014, 7-10 pm

Please notify the instructor in writing by the second week of the semester, if you have any potential conflict(s) about the class schedule, or if you need special accommodations such as: disability-related accommodations, emergency medical information you wish to discuss with the instructor, or special arrangements in case the building must be evacuated.