

ME 555: Automatic Control Systems Course Syllabus - Spring 2008

Instructor: Dr. Qian Wang
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Prerequisites: ME 455 or equivalent

Class Schedule: MW, 4:15 pm – 5:30 pm, 101 Leonhard

Office Hours: M 1:10 pm – 2:10 pm, W 11:00 am – 12:00 pm

Text/References:

Linear System Theory and Design by C.-T. Chen, Oxford University Press, 1998.

Linear Systems by T. Kailath, Prentice-Hall, 1980.

Linear System Theory by W. J. Rugh, Prentice-Hall, 1993.

Optimal Control: Linear Quadratic Methods by B. D. O. Anderson and J. B. Moore, Prentice-Hall, 1990.

Fundamentals of Linear State Space Systems by J. S. Bay, McGraw-Hill, 1998.

Linear Systems: Optimal and Robust Control by A. K. Sinha, CRC, 2007.

Grading:	Homework	40%
	Midterm	25%
	Final Project & Presentation	35%

Students are encouraged to study in pairs or in groups, but the work that you submit must be your own. Homework problems will be due one week after assignment. No credit will be given for late submissions except medical reasons or get the instructor's permission in advance.

Course Description:

This course focuses on linear systems theory with introduction to linear optimal control. Topics include state-space realizations of transfer functions, canonical forms, the Cayley-

Hamilton theorem, controllability, observability, pole placement, observers and observer-based controller design, preliminaries on principles of optimality, and Linear-Quadratic control design. The course will cover time-invariant systems and time-varying systems with an emphasis on the time-invariant systems.

Course Objectives:

Upon completion of the course, students should be able to:

1. Grasp mathematical basics for linear systems: Solutions of state equations, state transition matrices, canonical realizations, controllability and observability, stability of linear systems, Lyapunov method, observer and observer-based controller design.
2. Grasp basic principles of optimal control: conditions for optimality, Linear-Quadratic regulator and Kalman filter.
3. Use Matlab toolbox to design Linear-Quadratic regulators for toy examples.

Disabilities Policy

In compliance with the Americans with Disabilities Act (ADA), all qualified students enrolled in this course are entitled to “reasonable accommodations.” Please notify me during the first week of class of any accommodations needed for the course. Also, you must contact a staff member for Disabled Student Services.

Academic Integrity

Information pertaining to Penn State’s policy on academic integrity can be found at <http://www.engr.psu.edu/CurrentStudents/acadinteg.asp>. In this course, students are permitted to work together on homework assignments, but each student is required to submit his or her own original work. Students may not work together or cheat in any way on exams.