

University of Dayton
Dept. Electrical and Computer Engineering

ECE 509 Analysis of Linear Systems

Instructor: Prof. Raúl Ordóñez, KL344-C, raul.ordonez@notes.udayton.edu

Office Hours: T, Th 14h00 – 15h30. If these hours do not work well feel free to stop by any time I am in the office, or e-mail me for an appointment.

Text: *Linear Systems Theory and design*, Chi-Tsong Chen, Oxford University Press, 3rd edition, 1999.

Course Objective: This course will provide you with a fundamental understanding of state variable models of linear systems and their relationship to important aspects of engineering practice. You will learn the meaning of system state, and how this powerful concept may be used to describe and model a variety of systems. Moreover, you will learn how to design systems represented by state variable models using pole placement methods and state observers. The course will include a significant computer simulation component.

Outline of topics

- 1) Linear systems concepts
- 2) The concept of system state: state variables and state space
- 3) Review of linear algebra
- 4) The state equation and its solution:
 - a. State transition matrix
 - b. Relationship to transfer function representation of systems
- 5) Stability
- 6) Controllability and observability
- 7) State feedback, pole placement
- 8) State observers, separation principle, linear output feedback

Grading:	Homework	□	15%
<i>(Tentative)</i>	Quizzes	□	15%
	Midterm exam	□	25%
	Projects	□	20%
	Final exam	□	25%

Miscellaneous:

- Homework will be assigned regularly and collected on the specified date. Grading will be on a 0-4 scale, where 4 represents a good effort and approach to solving each problem. Homework will typically contain computer simulations to be done in Matlab.
- All assignments must be completed as a course requirement; penalty for late homework will be severe. You are responsible for any and all alterations in homework assignments, exam and other dates, and course announcements in general which occur in the lecture. In other words, come to class!