

University of Dayton
Dept. Electrical and Computer Engineering

ECE 695 Interconnected Systems – Winter 2007

Instructor: Prof. Raúl Ordóñez, KL341E, raul.ordonez@notes.udayton.edu.

Office Hours: You can come almost any time I am there, but try to make an appointment if not during office hours. Official office hours are T, Th, 14h00-15h30.

Text book: Various readings will be assigned, as needed.

References:

- ♦ *Decentralized Control of Complex Systems*, Dragoslav D. Siljak, Boston : Academic Press, 1991.
- ♦ *Nonlinear Systems*, Hassan K. Khalil, Prentice Hall, NJ, 3rd edition, 2002.
- ♦ *Linear Systems Theory and Design*, Chi-Tsong Chen, Oxford University Press, 3rd edition, 1999.
- ♦ *Stable Adaptive Control and Estimation*, Spooner et al, Wiley, 2002.

Course Objective: This course will present an overview of topics having to do with design and control of interconnected systems in both the linear and nonlinear case. The course will give a unifying view of MIMO and decentralized systems, as well as switched and interpolated systems and their control and analysis methods. It will also present multi-vehicle control topics, including cooperative foraging, swarming, formation control, and coordinated control of teams of agents, such as robots or uninhabited autonomous vehicles (UAVs).

Pre-requisites: ECE 547 or permission from the instructor (you can still take the class without having taken ECE547, as I will review the material as needed). ECE509 (can be taken at the same time).

Tentative Outline of topics

- 1) Introduction. Interconnected systems
- 2) Decentralized systems and MIMO systems
- 3) Stability and feedback stabilization of linear interconnected systems
- 4) Decentralized nonlinear systems
- 5) Switched and interpolated systems
- 6) Cooperative foraging
- 7) Swarming
- 8) Multi-vehicle formation control
- 9) Multi-vehicle team coordination and control

Grading:	Homework, projects	—	50%
<i>(Tentative)</i>	Midterm exam	—	25%
	Final exam	—	25%

Course web site:

Go to my homepage <http://homepages.udayton.edu/~ordonez/courses.html> and follow the 'quickplace' link. The username is "695student" (without the quotes).