THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Large Scale and Cyber-Physical Systems

ECE 7855

Credit Hours:
3.00 - 3.00

Course Levels:
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
Decentralization, hierarchy and their effects on modeling, stability analysis, and optimal controller design. Hybrid system based modeling and design of Cyber-Physical Systems.

Prerequisites and Co-requisites:
Prereq: 5750 (750).

Course Goals / Objectives:
- Give advanced students in control an introduction to the problems associated with controlling large, distributed/interconnected systems with a decentralized information structure
- Examples in interconnected power systems, traffic networks, large space structures are considered
- The complexity of decision-making, the analogies between engineering, economic and societal systems, and the interdisciplinary nature of control engineering practice is stressed

Course Topics:

- Examples of large-scale systems
- The issues of interconnection, decentralization, hierarchy, modeling, use of graphs
- Stability analysis of large interconnected systems
- Decentralization. Decentralized fixed modes, decentralized compensators
- The decentralized quadratic regulator, computational issues and suboptimality
- Two time-scale systems, time-scale hierarchy and introduction to singular perturbations
- Functional hierarchies, goal-task decompositions
- Problems in CyberPhysical Systems. Examples
- Hybrid Systems and testing

Designation:

Elective