



THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Nonlinear and Adaptive Control

ECE 7854

Credit Hours:

3.00 - 3.00

Course Levels:

Graduate (5000-8000 level)

Course Components:

Lecture

Course Description:

Advanced analysis of uncertain nonlinear systems. Design methodologies for complex interconnected nonlinear systems. Applications of nonlinear and adaptive control design to aerospace and robotic systems.

Prerequisites and Co-requisites:

Prereq: 6754 (5754 or 754) and 6750 (5750 or 750).

Course Goals / Objectives:

- Develop advanced tools for the control of nonlinear interconnected systems
 - Provide a broad treatment of classical results in the stabilization of nonlinear systems
 - Give a detailed exposition of adaptive back-stepping and control-Lyapunov function techniques
 - Introduce the students to some of the most recent results in robust nonlinear regulation and tracking
 - Introduce realistic and challenging examples of nonlinear control systems design
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Course Topics:

- Normal forms of nonlinear systems
 - Linearization by feedback
 - Zero-dynamics and local stabilization
 - Robust and adaptive Lyapunov redesign
 - Global stabilization by state feedback
 - Passivity-based control
 - Semi-global stabilization
 - Nonlinear separation principle and output-feedback design
 - Stabilization by saturated control
 - Adaptive back-stepping design
 - Nonlinear adaptive regulation
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Designation:

Elective