THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Nonlinear Systems Theory

ECE 6754

Credit Hours:
3.00 - 3.00

Course Levels:
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
Provides fundamental mathematical tools for the analysis of nonlinear dynamical systems. Basic techniques for the synthesis of nonlinear control systems are introduced.

Course Goals / Objectives:
- Develop fundamental mathematical tools for analysis of nonlinear control systems
- Provide an in-depth treatment of Lyapunov and input-output stability theory for nonlinear systems
- Introduce examples and applications of nonlinear system modeling and control
- Introduce useful physics and engineering concepts from the theory of dissipative systems
- Introduce useful engineering concepts for the study of nonlinear oscillatory phenomena

Course Topics:

- Nonlinear systems
- Fundamental properties of solutions
- Elementary geometric properties of solutions
- Stability theory for autonomous systems
- Invariance principle and asymptotic behavior
- Center manifold theorems
- Stability theory for non-autonomous systems
- Converse Lyapunov theorems
- Input-to-state stability
- Input-output stability
- Dissipative systems & passivity
- Stability of perturbed systems
- Singular perturbations and averaging

Designation:

Elective