

EE 827 Non-Linear Control Systems (3-0)

Textbook: Non-Linear Systems by Hassan K. Khalil, 3rd Edition, Prentice Hall, 2002. ISBN-10: 0130673897, ISBN-13: 978-0130673893

Reference Book: Applied Nonlinear Control by Jean-Jacques Slotine and Weiping Li, Prentice Hall, 1991. ISBN-10: 0130408905, ISBN-13: 978-0130408907.

Objective:

This course is aimed at teaching the students about techniques used for control of NonLinear systems.

Pre-Requisite:

EE 826 Linear Control Systems (or equivalent)

Course Outcome:

The students graduating from this course are expected to have a firm grasp of mathematical modeling of non-linear systems, their stability analysis, linearization techniques as well as control design.

Course Outline:

Topics	Allocated Periods
State Space Modeling of Nonlinear Systems	45
Concepts of Equilibrium point	
Phase Portrait	
Attractor domain and Separatrices	
Limit Cycle & Invariant sets	
Lyapunov Stability Analysis	
Differential Geometry	
Concept of Lie Derivative & Lie Bracket	
Diffeomorphisms for Controllable & Observable canonical forms	

Exact Input – State Linearization & concept of Zero Dynamics	
Exact Input – Output Linearization	
Small Signal (Inexact) Linearization	
Gain Scheduling Control	
Back-stepping Control	
Sliding Mode Control	
Lyapunov Redesign	