

**Course Number: 28595**

**Course Name: Nonlinear Systems Control**

Course Type:
Prerequisite: Automatic Control (B.Sc.), Advance Control (M.Sc.)
Level: Graduate
Group: Applied mechanics

Type & Max Unit: 3
Corequisite:
First Presentation:
Last Edition:

**Objectives:**

**Topics:**

- Introduction: Introduction to nonlinear control systems, Definitions, Properties and All kind of Nonlinear components
- Phase Plane: Definitions, Properties, Second Class systems, Equilibrium Points and their kind, Sketching Methods
- Expansion function Methods and Limit cycles
- Lyapunov Stability Analysis based Method
- Control System Design by using Lyapunov Stability Analysis Method
- Controllers Design based on linear feedback: Accurate Feedback, Inter- state Linearization, Outer- state Linearization, Li Algebra
- Sliding Mode Control
- Selected Topics in Control

**References:**

- Khalil, K.H., Nonlinear Systems, 2<sup>nd</sup> Ed., Prentice Hall, 1996
- Isidori, A., Nonlinear Control Systems, 3<sup>rd</sup> Ed., Springer, 1995
- Slotine, J. J. E., Li, W., Applied Nonlinear Control, Prentice Hall, 1991
- Vincent, T. L., Granthan, W.J., Nonlinear and Optimal Control Systems, John Wiley & Sons, 1997
- Leigh, J.R., Essential Of Nonlinear Control Theory, Peter Peregrinus LTD (for IEE), 1983
- Parks, P.C., Hahn, V., Stability Theory, Prentice Hall, 1992
- Edwards, C., Spurgeon, S., Sliding Mode Control: Theory and Application, Taylor & Francis LTD., 1998
- Kapitaniak, T., Chaos for Engineering, 2<sup>nd</sup> Ed., Springer, 2000