Ordinary Differential Equations - Web course

COURSE OUTLINE

Module 1: Existence and Uniqueness of solution.

Module 2: Linear system of First order ODE

Module 3: Second order Linear differential equations

Module 4: Phase plane analysis

Module 5: Stability Analysis

COURSE DETAIL

Module No.	Topic/s	Lectures
1	Existence and Uniqueness: Integral inequality, Picard's Theorem, Cauchy-Peano's Theorem, E-approximate solutions, Maximal and Minimal Solutions, Granwall inequality, continuity and differentiability w. r. t. initial conditions, Systems and Global existence.	7
2	Linear equations and systems: general theory, Wronskian, method of Variation of parameters, equations with constant coefficients and method of undetermined coefficients, systems with constant coefficients and exponential of a matrix, Routh-Huruwitz criterion, asymptotic behavior.	13
3	Second order linear equations, distributions of zeros of a solution, Sturm comparison theorem, oscillations and non oscillations, two point BVP, Green's function and Picard's theorem for BVP	10
4	Stationery points and phase portraits.	4
5	Elements of Stability theory and Lyapunov function, direct theorems.	8

References:

1. Ordinary differential equations by E.A. Coddington and N.Levinson

2. The Qualitative Theory of ordinary Diff. equations by Fred Brauer and J.A. Nohel

3. Ordinary differential equations by George F. Simmons

4. Text on ordinary differential equations by S.G.Deo, V. Lakshmikantham and Raghavendra.V.

5. Differential Equations And Dynamical Systems by Lawrence M.Perko

NPTEL

http://nptel.iitm.ac.in

Mathematics

Pre-requisites:

A course on real analysis and Linear algebra

Additional Reading:

1. Ordinary differential equation by E.A.Coddington

2. Advanced Engg. Mathematics by Irving Kreyzig

3. Differential equations; A geometrical approach by S. Lefchtez

Coordinators:

Prof. V. Raghavendra
Department of MathematicsIIT Kanpur