

MA465 Ordinary Differential Equations

Credit: 3-0-0-3

Approval: Approved in 2nd Senate

Prerequisites: - MA-101

Students intended for: B. Tech

Elective or core: Elective

Semester: Odd/Even

Course content:

- **Basic Theory:** Existence and uniqueness of solutions, continuation of solutions, global existence, dependence of solutions on initial conditions, regularity of the flow, First and second order differential equations, Contraction mapping principle. [18 hours]
- **Linear Systems:** The fundamental matrix, Equilibrium points and their stability, Sturm-Liouville theory. [12 hours]
- **Nonlinear Systems:** The Poincare-Bendixon theorem, Perturbed systems, Lyapunov functional, Local and global analysis. [10 hours]

Texts Books:

Arnold, V., *Ordinary Differential Equations*, MIT Press, 1978.

Coddington, E. A. and Levinson, N., *Theory of Ordinary Differential Equations*, Krieger Publishing Co, 1984.

Ahmad, S. Rao, M.R.M., *Theory of ordinary differential equations with applications in biology and engineering*, EWP publication, 1999.

Reference Books:

Perko, *Differential Equations and Dynamical Systems*, Springer.

Devaney, R., Hirsch, M. W. and Smale, S., *Differential Equations, Dynamical Systems, and an Introduction to Chaos* (2nd Edition), Academic Press, 2003.

Birkhoff, G. and Rota, G.-C., *Ordinary Differential Equations*, wiley, 1989.

Other Faculty Members interested in teaching this course: NA

Proposed by: Dr. Syed Abbas.

School: School of Basic Sciences, IIT Mandi