Code	Subject Title	Cr. Hrs	Semester
MATH-312	Ordinary Differential Equations	3	VI
Year	Discipline		
3	Mathematics-I,II		

First and Second Order Differential Equations

- Review of ordinary differential equations
- Techniques of solving second and higher differential equations

Sturm Liouville Systems

- Some properties of Sturm-Liouville equations
- Regular, periodic and singular Sturm-Liouville systems and its applications

Series Solutions of Second Order Linear Differential Equations

- Review of power series
- Series solution near an ordinary point
- Series solution near regular singular points.

Series Solution of Some Special Differential Equations

- Hypergeometric function $F(a, b, c; x)$ and its evaluation
- Series solution of Bessel equation
- Expression for $J_n(X)$ when n is half odd integer, Recurrence formulas for $J_n(X)$
- Series solution of Legendre equation
- Rodrigues formula for polynomial $P_n(X)$
- Generating function for $P_n(X)$
- Recurrence relations, orthogonal polynomials
- Orthogonality of Bessel functions
- Expansions of polynomials
- The three term recurrence relation

Recommended Books

1. E. D. Rainville, *Special Functions* (Macmillan and Company, 1971)
2. G. E. Andrews, R. Askey and R. Roy, *Special Functions* (Cambridge University Press, 2000)
3. D. G. Zill, *Advanced Engineering Mathematics* (Jones and Bartlett Publishers, 2005)
4. W. E. Boyce and R. C. Diprima, *Elementary Differential Equations and Boundary Value Problems* (John Wiley and Sons, 2005)
5. N. M. Temme, Special Functions, An Introduction to the Classical Functions of Mathematical Physics (John Wiley and Sons, 1996)
6. E. T. Whittaker, and G. N. Watson, A Course of Modern Analysis (Cambridge University Press, 1958)