

Second Semester

MA 102

Mathematics II

(3 1 0 8)

Pre-requisites: Nil

Linear Algebra: Vector spaces (over the field of real and complex numbers). Systems of linear equations and their solutions. Gauss elimination method, Jacobi method, Gauss Seidel method. Matrices, determinants, rank and inverse. Linear transformations. Range space and rank, null space and nullity. Eigenvalues and eigenvectors. Similarity transformations. Diagonalization of Hermitian matrices.

Ordinary Differential Equations: First order ordinary differential equations, exactness and integrating factors. Variation of parameters. Picard's iteration. Numerical methods: Euler method and RK method. Ordinary linear differential equations of n-th order, solutions of homogeneous and non-homogeneous equations. Method of variation of parameters.

Power series methods for solutions of ordinary differential equations. Legendre equation and Legendre polynomials, Bessel equation and Bessel functions.

Systems of ordinary differential equations, Laplace Transform and its application to ODEs

Phase plane, critical point, stability.

Texts:

- K. Hoffman and R. Kunze, Linear Algebra, Prentice Hall, 1996.
- Gilbert Strang, Introduction to Linear Algebra, 4th Edition (South Asian), Wellesley Cambridge Press, 2009.
- T. M. Apostol, Calculus, Volume II, 2nd Edition, Wiley, 1969.
- S. L. Ross, Differential Equations, 3rd Edition, Wiley, 1984.
- E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall, 1995.
- W.E. Boyce and R.C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 7th Edition, Wiley, 2001.

References:

- E. Kreyszig, Advanced Engineering Mathematics, 9th Edition, Wiley, 2005.