COURSE CODE: MAT 4119
COURSE TITLE: ENGINEERING MATHEMATICS III

Pre-requisite: MAT 3110 – Engineering Mathematics II

Course Contents

1. *Introduction to Numerical Methods Mathematical Preliminaries*
   Analytical versus numerical analysis; Taylor series expansions; Accuracy; precision and bias; Analysis of numerical errors.
2. *Solutions of Equations in One Variable*
   The Bisection method; Fixed point iteration; The Newton – Raphson method;
   Error Analysis; Multiple roots.
3. *Numerical Solutions of Non-linear systems of Equations.*
4. *Simultaneous Linear Equations*
   Gaussian elimination method; Jacobi iterations; Gauss Seidel iterations.
5. *Numerical Interpolation*
   Gregory–Newton interpolation method; Newton's finite difference interpolation; Lagrange polynomials; Interpolation using splines.
6. *Numerical Differentiation and Integration*
7. *Initial Value Problems for Ordinary Differential Equations*
   Euler's Method; Higher order Taylor method; Runge Kuta methods.
8. *Complex Functions*
   Derivative; Analytic function; Cauchy Riemann equations; Exponential function; Trigonometric functions; Hyperbolic functions; Logarithms; General power; Complex integration.

Prescribed books:

1. Numerical Analysis, Burden R. L. and Faires J. D., PSW Kent
2. Advanced Engineering Mathematics, Kreyszig E., John Wiley and Sons.
3. Theory of functions of a complex variable, Eighth edition, Narayan S. and Mittal P. K.,S.Chand.