

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab.	Tut.	Private study	Pre-requisites	Course Level
MAT	1346	Numerical Analysis	5	4	0	2	10	MAT 1228	6

Topics Outline

- 1. Introduction to data representation:** Numerical Errors, Floating Point Representation, Round-off; Significant Digit, Error Propagation.
- 2. Root Finding:** Bisection Method, Newton's Method, Secant Method, Fixed Point Iterations.
- 3. Interpolation and Approximation:** Taylor polynomials, Approximation of order n , Polynomial Error, Linear and Quadratic Interpolation, Lagrange Interpolation, Newton Divided Difference Method, Error Evaluation.
- 4. Numerical Integration and Differentiation:** The Trapezoidal and Simpson Rules, Gaussian Quadrature, Numerical Differentiation.
- 5. Numerical Solution of Linear Systems:** Gauss Elimination, LU and Cholesky Decompositions, Iterative Methods: Jacobi and Gauss-Siedel Methods, Error Analysis.
- 6. Numerical Solution of Differential Equations:** Euler Method, Runge-Kutta Methods, and Multistep Methods. Error and Convergence Analysis.
- 7. Computer Software use:** implement the numerical methods studied during the lectures in a programming language and use existing mathematical software packages to solve different problems.

References

Numerical Analysis, R. Burden and J. Faires, 8th Edition, Brooks/Cole, 2001.

An Introduction to Numerical methods and Analysis, James F. Epperson, Wiley, 2002.

Elementary Numerical Analysis, Kendall Atkinson; Weimin Han, 3rd Edition, 2004.