



MAT 641 – Numerical Analysis

Course Code & Number	Course Name	Credit Hours	Lec.	Lab.	Tut.	Prerequisites
MAT 641	Numerical Analysis	4	3	1	1	

Syllabus:

Solving Equations: Newton’s method, Brent method, Aitkin’s Δ^2 method & Muller method; Error and convergence analysis.

Solving Linear Systems: Direct methods: Pivoting, LU; Error analysis; Iterative methods: Jacobi, Gauss-Seidel & SOR methods; Krylov subspaces methods (Conjugate gradient method, GMRES,...); Error and convergence analysis; Preconditioning.

Solving Ordinary Differential Equations: Implicit and Explicit Euler Methods; Local and global error; Taylor and Runge Kutta methods; Predictor Corrector methods; Implicit Methods and Stiff Equation; Multistep Method; Error and convergence analysis, stability, and consistency; Numerical methods for solving system of first order differential equations; Examples of implementation.

References:

1. J. Stoer and R. Burlish; *Introduction to Numerical Analysis*; Springer-Verlag, 3rd Ed.2010. **(Main Reference)**
2. T. Sauer; *Numerical Analysis*, Pearson 2012.
3. Richard L. Burden and J. Douglas Faires; *Numerical Analysis*, 9th Ed. Brooks/Cole, Cengage Learning, 2011.

