UG	Department: **Chemical Engineering**
Course Code: **CH211**	Course Name: **Numerical Methods in Chemical Engineering**
Credit: **2**	L-T-P: **2-0-0**
Version: **1**	Approved on:
Prerequisite Course: **Nil**	

Linear Algebraic Equations: Introduction, Gauss-Elimination, Gauss-Siedel and LU Decomposition methods, Thomas' algorithm.
Eigen Values and Eigen Vectors of Matrices: Introduction, Fadeev-Leverrier's method, Power method, Householder's and Givens' method.
Nonlinear Algebraic Equations: Single variable and multivariable successive substitution method, single variable and multivariable Newton-Raphson technique, Polynomial root finding methods.
Function Approximation: Least squares curve fit, Newton's interpolation formulae, Lagrangian interpolation, Pade approximation, Cubic spline approximation. Integration formulae: Trapezoidal rule, Simpson's rule.
Ordinary Differential Equations - Initial Value Problems: Explicit Adams-Bashforth technique, Implicit Adams-Moulton technique, Predictor-corrector technique, Runge-Kutta methods, Stability of algorithms.
Ordinary Differential Equations - Boundary Value Problems: Finite difference technique, Orthogonal Collocation (OC), Shooting Techniques.
Partial Differential Equations: Partial Differential Equations (PDE) - Classification of PDE, Finite difference technique (Method of lines), Orthogonal collocation.
Case Studies. Use of spreadsheets and MATLAB in Chemical Engineering.

Books

1. Gupta, S. K., "*Numerical Methods for Engineers*," New Age International Ltd., New Delhi, 1995.
2. Constantinides, A., and Mostoufi, N., "Numerical Methods for Chemical Engineers with MATLAB Applications," Prentice Hall, 1999.
3. Hanna, O.T. and Sandall,O.C., *"Computational Methods in Chemical Engineering,"* Prentice-Hall, 1995.
4. Davis, M.E., *"Numerical Methods & Modeling for Chemical Engineers,"* John Wiley, 1984.
5. Press, W. H., Teukolsky, S. A., Vellerling, W. T., Flannery, B. P., "*Numerical Recipes in C*," 2nd ed., Cambridge University Press, New Delhi, 1992.