

COURSE OUTLINE

Course Code: CSE 218

Course Title: Numerical Methods

Level/Term: 2/I

Section: A/B

Academic Session: January, 2019

Course Teacher:

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Course Outline:

Introduction; Solution of Non-linear Equations: Fixed Point Iteration, Bi-Section method, False Position method, Newton-Raphson method, Bairstow's Method; Solution of Linear equations: Triangular systems and back substitution, Gauss-Jordan elimination method, Pivoting, LU-factorization, Cholesky's method, Dolittle and Crout factorization; Interpolation and Approximation: Taylor's Series, Lagrangian interpolation, Divided differences formula, Newton's forward and backward interpolation, Spline interpolation; Differentiation: Numerical differentiation, Richardson's extrapolation; Integration: Newton's-Cote integration, Trapezoidal rule, Simpson's rule, Romberg's integration; Ordinary Differential Equations: Euler's method, Picard's method, Milne's method, Taylor's series method, Runge-Kutta method; Curve Fitting: Least squares lines, Least square polynomials, Non-linear curve fitting; Numerical Optimization: Golden Ratio search, Newton's search, Powell's method, Gradient search.

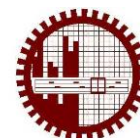
Learning Outcomes/Objectives:

After undergoing this course, students should be able to:

- Understanding the basic concepts and theory of numerical methods.
- Perform detailed analysis of different algorithms of numerical methods.
- Apply the knowledge acquired in the course to solve real life problem.

Assessment

Offline:	35-40%
Online:	20-25%
Attendance:	10%
Quiz:	25-35%



Learning Resources:

- Numerical Methods for Engineers: Steven C. Chapra and Raymond P. Canale.

Weekly schedule:

Week	Topics
Week 1	Introduction to Numerical methods, Introduction to Python
Week 2	Advanced Python, graphical tools for python, numpy, pandas
Week 3	Approximation and Round-off error, Truncation error and Taylor Series, Roots of equation (Bracketing method & Open Methods) Declaration of offline
Week 4	Offline submission + online
Week 5	Introduction to Linear System
Week 6	Optimization and Remaining part of Linear System Declaration of offline on Linear Systems
Week 7	Offline submission
Week 8	Curve fitting + quiz Declaration of offline on curve fitting
Week 9	Offline submission + online
Week 10	Numerical Differentiation and Integration Declaration of offline on Numerical Differentiation and Integration
Week 11	Offline submission + online
Week 12	Ordinary and partial differential equation Declaration of offline on differential equation
Week 13	Offline submission
Week 14	Quiz