

Course Code Course Title No. of Credits Pre-requisites Compulsory/Optional	EM 315 Numerical Methods for Civil Engineers 2 - Compulsory
Aim(s): To introduce numerical methods for solving mathematical models of Civil Engineering problems.	
Intended Learning Outcomes: On successful completion of the course, the students should be able to; <ul style="list-style-type: none"> • Explain, apply and analyze numerical methods for finding roots of equations, interpolation and curve fitting. • Explain, apply and analyze numerical methods for solving ordinary and partial differential equations. • Select suitable algorithms and apply for solving partial differential equations related to Civil Engineering problems 	
Time Allocation (Hours): Lectures 26 Tutorials 04 Practical Assignments	
Course content/Course description: <ul style="list-style-type: none"> • Error analysis • Solutions to nonlinear equations: bisection method; method of false position; fixed-point iteration; Newton-Raphson's method; secant method. • Numerical solutions to systems of linear equations: Gaussian elimination; Jacobi method; Gauss Seidel method • Interpolation: Newton interpolating polynomial; Lagrange interpolating polynomial; Spline interpolation. • Approximation and curve fitting: Linear regression; polynomial regression; • Numerical Quadrature: Gaussian Quadrature • Numerical solutions to ordinary differential equations: Initial value problems: Euler method, Runge - Kutta methods; Boundary value problem: Finite difference method • Numerical solutions for partial differential equations: Finite difference method: Elliptic equations: 1D and multi-dimensional problems; parabolic problems; Integral Equation Methods: Collocation method, Galerkin method and Weighted Residual method ; 	
Recommended Texts : <ul style="list-style-type: none"> • C. Chapra and R.P.Canale, (2010). <i>Numerical Methods for Engineers</i>, 6th edition, McGraw-Hill. 	
Assessment	Percentage Mark
In-course Tutorials/Quizzes	20

Mid Semester Examination	30
End-Semester	50