<table>
<tr><th colspan="5">NATIONALLY HARMONISED B.Sc. CHEMICAL ENGINEERING PROGRAM</th></tr>
<tr><td>Course Code</td><td colspan="4">Math2072</td></tr>
<tr><td>Course Name</td><td colspan="4">Numerical Methods</td></tr>
<tr><td>Degree Program</td><td colspan="4">B.Sc. in Chemical Engineering</td></tr>
<tr><td>Module Name</td><td colspan="4">General</td></tr>
<tr><td>Module Coordinator</td><td colspan="4">N.N.</td></tr>
<tr><td>Lecturer</td><td colspan="4">N.N.</td></tr>
<tr><td>ECTS Credits</td><td colspan="4">6CP</td></tr>
<tr><td rowspan="2">Contact Hours (per week)</td><td>Lecture</td><td>Tutorial</td><td>Laboratory or Practice</td><td>Home study</td></tr>
<tr><td>3</td><td>0</td><td>3</td><td>2</td></tr>
<tr><td>Students load per semester</td><td>48</td><td>0</td><td>48</td><td>32</td></tr>
<tr><td>Mode of delivery</td><td colspan="4">Parallel (Semester wise)</td></tr>
<tr><td>Course Objectives & Competences to be Acquired</td><td colspan="4">The course aims to introduce the students with the primary and basic computational & numerical methods to solve chemical engineering problems.
After completion of the course:
• The students will be able to solve numerical problems of multi variable and equations .
• The students will be able to understand their application to systems involving physical and chemical processes</td></tr>
<tr><td>Course Description/Course Contents</td><td colspan="4">• Chemical engineering, mathematical modeling and computational methods</td></tr>
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	Chemical engineering and mathematical Models Computational methods Problem solving steps using computers Numerical solution and errors Roots of Nonlinear Equations in One Variable Equations Encountered with Example Problem(s) Numerical Methods: Bracketing Methods: Bisection, False Position Open Methods: Fixed Point, Newton-Raphson, Secant Systems of Linear Equations Equations Encountered with Example Problem(s) Review of Matrix Algebra Numerical Methods: Direct Methods: Gaussian Elimination, LU (PLU) Decomposition, Thomas Algorithm Iterative Methods: Jacobi, Gauss-Seidel, SOR Approximation and Curve Fitting Regression and Interpolation Problems Encountered with Examples Least Squares Regression: Simple, Multiple, and General Interpolation: Polynomial (Difference and Lagrange Polynomials) Inverse Interpolation Numerical Differentiation and Integration Problem Encountered with Examples Numerical Differentiation Numerical Integration: Newton-Cotes Formulas, Gaussian Quadrature, Adaptive Quadratures Numerical Solutions of Ordinary Differential Equations (ODEs) Equations Encountered with Example Problems Initial Value (IV) ODEs Single First Order (IV) ODEs Taylor's Methods Runge-Kutta Methods Multistep Methods Higher Order ODEs and Systems of First Order ODEs Boundary Value ODEs Shooting Method Finite Difference Method Consistency, Stability, Convergence and Stiffness
Pre-requisites	ChEg2051 (Introduction to Computer and Programming)
Semester	Year II, Semester II
Status of Course	Compulsory

Teaching & Learning Methods	Lectures, lab practice, tutorial
Assessment/Evaluation	Continuous Assessment.....50% • Assignment.....(2x10)20% • quiz.....20% • practice.....10% Final exam.....50%
Course Policy	**Attendance**: As per nationally harmonized academic policy **Assessments**: students are supposed to handle all assessments on time. **Cheating/plagiarism:**it is strictly forbidden and any misconduct is accountable per the students' code of conduct.
Literature	**Text Book/** Steven C. Chapra, Numerical Methods for Engineers **Reference Books** 1. Erwin Kreyszig (2005). Advanced Engineering Mathematics, 9th edition, Wiley 2. Ellis, R. and Gulick, D. (1998). Calculus with Analytic Geometry, 5th edition. Harcourt 3. Stewart, J. (2002), Calculus, 5th edition, Brooks Cole 4. Churchil, R. V. (2003). Complex Variables and Application, 7/e, McGraw Hill Edition
Approval section	**Course team**