Department of Computer Science and Engineering
Lesson Plan

Course Title: Computational Methods for Engineering Problems **Level/Term**: 3/1 **Credit Hour**: 3.00 **Prerequisite**: EM-III **Semester**: 5th	**Course Code**: CSE 301 **Section**: Fall(September), 2019 **Contact Hours**: 3 Hour x 13 Weeks **Type** : Inter-Disciplinary Engineering Courses
Instructor: Tania Noor **Contact No.:** 01724422413 **E-mail:** taniatima@gmail.com	
Counseling Time: Wednesday (2.30-3.00), Monday (4.30-5.30), Sunday (2.30-3.30)	

Rationale:

This course is designed to make the understanding about computational concepts.

Objective of the Course:

- This course is intended to solve various scientific and engineering problems.
- Analyze and evaluate the accuracy of common numerical methods in its applications.
- The course will further develop mathematical modeling skills for experiments and research.

Course Outcomes (COs):

Upon successful completion of this course, students will be able to:

CO 1. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to other intractable mathematical problems.

CO 2. Analyze and evaluate the accuracy of common numerical methods.

CO 3. Apply numerical methods to obtain approximate solutions of mathematical problems.

Course Description:

Numerical Methods:

The calculus of finite Differences: The operation E ,δ, ζ and their algebraic properties, Difference tables, Forward, Backward and General Differences fundamental theorem of Difference Calculus. Solution of Algebraic and Transcendental Equation: Bisection algorithm, Method of false position. Fixed point iteration, Newton-Raphson method, Error analysis for iterative method, Accelerating limit of convergence. Interpolation and polynomial approximation: Taylor polynomials, Interpolation and Lagrange polynomial, Iterated Interpolation, Extrapolation. Differentiation and Integration: Numerical Differentiation, Numerical Differential Equation: ODE & PDE, Curve Fitting. Solutions of linear systems: Gaussian elimination and backward

substitution, pivoting strategies, LU decomposition method.

Text and Reference books:

Text Books:

(1) Numerical Analysis by Vasistha, (2) Numerical Analysis by Richard L. Burden,
(3) Numerical methods for scientific and engineering computation by Mahinder Kumar Jain, S. R. K. Iyengar, Rajendra K. Jain,(4) Advanced Engineering Mathematics by H.K. Dass

References:

(1) Numerical Analysis by Vasistha, (2) Numerical Analysis by Richard L. Burden

CO delivery and assessment:

COs	Corresponding POs	Bloom's taxonomy domain/level *(C: Cognitive, P: Psychomotor A: Affective)*	Delivery methods and activities	Assessment tools
CO1	PO 1	A1,A2	Lecture, Notes, Problem solution	Class Test
CO2	PO 2	C2,C3	Lectures, Notes, Practice Problems	Mid term, Assignments.
CO3	PO 3	C4	Lectures, Notes, Practice Problems	Final Exam, Assignment

Recall:
2. Domains and Levels of Bloom's Taxonomy
- *"Cognitive" Domain (C): C1 - Recall data, C2 - Understand, C3 - Apply, C4 - Analysis, C5 - Synthesize, and C6 - Evaluate.*
- *"Affective" Domain (A): A1 - Receive, A2 - Respond, A3 - Value, A4 - Organize personal value system, and A5 - Internalize value system.*
- *"Psychomotor" Domain (P): P1 - Imitation, P2 - Manipulation, P3 - Develop precision, P4 -Articulation, and P5 - Naturalization.)*

CO-PO Mapping (Theory course):

CO/PO Mapping												
COs	Program Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√											
CO2		√										
CO3			√									

Lesson	Topic	Teaching strategy	Course Outcome (CO)	Assessment Strategy
L-1	Introduction to the syllabus; Discuss Geometrical method to find real root of the equation	Lecture	CO1	
L -2	Discuss Geometrical representation of	Lecture	CO1+CO3	

			CO3,CO4, CO5	

** Another Class Test may be taken if necessary. Any one of three class test can be pop test or instant test. Not more three class test can be happened.