Ahsanullah University of Science and Technology
Bangladesh

COURSE OUTLINE

1. Title: Numerical Methods Lab247, PEO, to be announced, 12

2. Code: CSE2202

3. Credit hours: 3

4. Level: Level 2, Term 2

5. Faculty: Engineering

6. Department: Computer Science and Engineering (CSE)

7. Programme: Bachelor of Science in Computer Science and Engineering (B.Sc. in CSE)

8. Synopsis from the Approved Curriculum: Laboratory works based on CSE2201.

9. Type of course (core/elective): Core

10. Prerequisite(s) (if any):

11. Name of the instructor(s) with contact details and office hours:

> **Raqeebir Rab**
> **Room: 7A01/L**
> **Phone: Extension 516**
> **E-mail: raqeebir.cse@aust.edu**
> **Office hour: MON 1:00 – 2:00 PM, TUE 2:00 – 2:30 PM**

12. Semester Offered: Fall, 2021

13. Mapping of Course Outcomes with Bloom's Taxonomy and Programme Outcomes

Sl. No.	COs	POs	Bloom's Taxonomy		
			C	A	P
1	Comprehend the fundamental concepts of error analysis and numerical methods	1			2
2	Apply proven techniques from numerical methods to solve computational and mathematical problems using modern tools and techniques.	2			3
3	Analyze closely related techniques and methods on selected problems on numerical models.	4			4

14. Mapping of COs with Knowledge Profiles, Complex Engineering Problem Solving and Complex Engineering Activities

Course Outcome	Knowledge Profile	Complex Problem Solving	Complex Engineering Activities
CO1	K3		
CO2	K4		
CO3	K8		

15. Percentages of Assessment Methods

Method	Percentage
Class Performance	20
Online	60
Final Examination	20

16. Week wise distribution of contents and assessment methods

Week	Topics	Assessment Method(s)
1	➢ **Introduction to Numerical methods.** ➢ **Finding roots of a non-linear equation using Bisection Method.**	
2	➢ **Finding roots of a non-linear equation using False Position Method.** ➢ **Finding roots of a non-linear equation using Newton-Raphson Method.**	

3 4	➢ Finding roots of a non-linear equation using Bisection Method. ➢ Finding roots of a non-linear equation using False Position Method.	**Online 1**
5 6	➢ Finding roots of a non-linear equation using Newton-Raphson Method. ➢ Finding root of a non-linear equation using Secant Method. ➢ Finding root of a non-linear equation using fixed point ieration. ➢ Evaluate Polynomial sing Horner's Rule	**Online 2**
7 8	➢ Finding all possible roots of a non-linear equation using Newton's Method. ➢ Finding all possible roots of a non-linear equation using Modified Bisection Method.	**Online 3**
9 10	➢ Finding root of a system of linear equations by Gauss Elimination Method. ➢ Finding root of a system of linear equations by Gauss-Jordan Method. ➢ Finding root of a system of linear equations by Gauss-Seidel Method. ➢ Finding root of a system of linear equations by Jacobi Method. ➢ Matrix Inversion Using Gauss Jordan Method ➢ Check the stability of System of Linear Equations.	**Online 4**
11 12	➢ Fitting a straight Line to a given set of data points. ➢ Fitting a Polynomial function to a given set of data points. ➢ Interpolate the value of y for a given x using Lagrange interpolation formula from a table of (x,y) values P. ➢ Interpolate the value of y for a given x by Newton's Divided difference interpolation formula from a table of (x,y) values.	**Online 5** **Lab Final Examination**
13 14	➢ Review Class. ➢ Check Pending Tasks.	

17. References

17.1. Required (if any)

1. *Numerical Methods* (4th Edition).
   Authored by: E. Balagurusamy
   Publisher: Tata McGraw-Hill, Inc, 1999.

2. *Numerical Analysis* (2nd Edition).
   Authored by: G. Shanker Rao.
   Publisher: New Age International (P) Limited, 1997.

17.2. Recommended (if any)

1. *Numerical Methods* for Engineers (4th Edition).
   Authored by: Steven C. Chapra, Raymond P. Canale
   Publisher: Tata McGraw-Hill, Inc, 2003.

Prepared by:	Checked by:	Approved by:
Signature: _____ Name: **Raqeebir Rab** Department: **CSE** Date:	Signature: _____ Name: **Dr. Mohammad Shafiul Alam** **OBE Program Coordinator, CSE** Date:	Signature: _____ Name: **Dr. Mohammad Shafiul Alam** HOD, **CSE** Date:

Annex-1: PEO of CSE

PEO1 - Professionalism
Graduates will demonstrate sound professionalism in computer science and engineering or related fields.

PEO2 – Continuous Personal Development
Graduates will engage in life-long learning in multi-disciplinary fields for industrial and academic careers.

PEO3 – Sustainable Development
Graduates will promote sustainable development at local and international levels.

Annex-2: Mapping of PEO-PO

	PEO1	PEO2	PEO3
PO1 - Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	√		
PO2 - Problem analysis: Identify, formulate, research and analyze complex engineering problems and reach substantiated conclusions using the principles of mathematics, the natural sciences and the engineering sciences.	√		
PO3 - Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.	√		
PO4 – Investigation: Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.	√		
PO5 - Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	√		
PO6 - The engineer and society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.	√		√
PO7 - Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.	√		√
PO8 – Ethics: Apply ethical principles and commit to professional ethics, responsibilities and the norms of engineering practice.	√		
PO9 - Individual work and teamwork: Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.	√	√	
PO10 – Communication: Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.	√		
PO11 - Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.	√		
PO12 - Life-long learning: Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.		√	

Annex-3: Blooms Taxonomy *

Level	Cognitive Domain – Revised Version	Affective Domain	Psychomotor Domain
1	Remember (1)	Receiving Phenomena (1)	Perception (1)
2	Comprehend (2)	Responding to Phenomena (2)	Set (2)
3	Apply (3)	Valuing (3)	Guided Response (3)
4	Analyse (4)	Organizing Values (4)	Mechanism (4)
5	Evaluate (5)	Internalising Values (5)	Complex Overt Response (5)
6	Create (6)		Adaption (6)
			Origination (7)

* Based on "REVISED BLOOM'S TAXONOMY INDICATOR v3.31" , available athttp://adept.mmu.edu.my/wp-content/uploads/2018/09/Blooms-Taxonomy-Indicator-v3.31.xls

Annex-4: Knowledge Profile