



## Ahsanullah University of Science and Technology

### Department of Computer Science and Engineering (CSE)

#### Course Outline

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Course No	: CSE2202
Course Title	: Numerical Methods Lab
Credit Hour	: 0.75
Semester (Session)	: Fall 2018
Student Year & Student Semester	: 2 <sup>nd</sup> Year, 2 <sup>nd</sup> Semester
Course Teacher(s)	: Dr. Md. Shafiul Alam, Associate Professor Shanjida Khatun, Assistant Professor

#### Course Objective:

1. Implement appropriate numerical methods to solve algebraic and transcendental equations
2. Implement appropriate numerical methods to approximate a function
3. Implement appropriate numerical methods to evaluate a derivative at a value
4. Implement appropriate numerical methods to solve a linear system of equations
5. Implement various numerical methods for finding root(s)

This lab complements the *Numerical Methods (CSE2201)* course.

**Preferred Programming Language/Tools:** C / C++ / Java.

#### Text/Reference books:

- E. Balagurusamy, **Numerical Methods**, 4<sup>th</sup> Reprint, Tata McGraw-Hill, Inc.
- G. Shanker Rao, **Numerical Analysis**, 2<sup>nd</sup> edition, New Age International (P) Limited.
- S. Chapra & R. Canale, **Numerical Methods for Engineers**, 6<sup>th</sup> edition, McGraw Hill.

#### Session Plan:

Week	Topics/Contents
1	➤ Introduction to Numerical methods.
2	➤ Finding roots of a non-linear equation using Bisection Method. ➤ Finding roots of a non-linear equation using False Position Method.
3	➤ Finding roots of a non-linear equation using Newton-Raphson Method.
4	➤ Finding roots of a non-linear equation using Secant Method.
5	➤ Finding all possible roots of a non-linear equation using Newton's Method.
6	➤ Finding all possible roots of a non-linear equation using Modified Bisection Method.
7	➤ Finding solution of a system of linear equations by Gauss Elimination Method.
8	➤ Finding solution of a system of linear equations by Gauss-Jordan Method.

9	<ul style="list-style-type: none"> <li>➤ Fitting a straight Line to a given set of data points.</li> <li>➤ Fitting a Polynomial function to a given set of data points.</li> </ul>
10	
11	<ul style="list-style-type: none"> <li>➤ Interpolating the value of <math>y</math> for a given <math>x</math> using Lagrange interpolation formula from a table of <math>(x,y)</math> values <math>P</math>.</li> <li>➤ Interpolating the value of <math>y</math> for a given <math>x</math> by Newton's Divided difference interpolation formula from a table of <math>(x,y)</math> values.</li> </ul>
12	
13	<ul style="list-style-type: none"> <li>➤ Review Class.</li> <li>➤ Check Pending Tasks.</li> <li>➤ <b>Lab Final Examination.</b></li> </ul>
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**Note:** *This Session Plan is subject to change. Course teacher will slow down or speed up each chapter to meet the needs of students.*

#### Marks Distribution:

Attendance and Class Performance	20
Assignment (Home Assignment/Offline/Class Assignment/Online)	40
Lab Quiz ( Mid Term and/or Term Final)	40
<b>Total</b>	<b>100</b>

In each lab class, some related programming problems will be given to the students that should be solved in the lab. Again, sometimes problems will be given on the same topic as individual assignments that will be checked in the next lab class.