

SWE422: Numerical Analysis with Lab

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| Course Instructor: | **Prianka Mandal (PM)**  [prianka.swe@diu.edu.bd](mailto:prianka.swe@diu.edu.bd) |

Course Outline

# Objectives:

In this course students will be introduced to the mathematical analysis of numerical methods by emphasising on different algorithms that are encountered in many disciplines like physical sciences and engineering. By the end of this course, students will be competent to solve complex mathematical problems using simple arithmetic operations such as ‘finding roots of equations’, ‘interpolation and regression analysis’, ‘numerical differentiation and integration’, ‘matrix problems’ etcetera. Students will learn how to derive formulas and apply algorithms to solve given mathematical problems in the theory class. In lab, students will implement these algorithms in MATLAB and simulate various problems. At the end of this semester students have to submit a project or attend a final examination to obtain marks in lab.

# Reference Book:

1. Numerical Method, By E. Balaswamy, 10th Edition
2. Numerical Methods for Engineers, Steven C. Chapra, Raymond P. Canale, 6th Edition

# Consultation Time:

My counselling hours are given in my routine.

# Assessment policy:

Three quizzes will be taken as per university policy and the average mark will be counted. Students have to complete some in-class assignment and homework on various exercises for theory class. There will be a mid-term and final examination, which students must attend. For lab assessment, students will be graded for accurate implementation of the theory algorithms taught in theory class. For final assessment in lab, students will either sit for a lab final or submit a project.

# Attendance policy:

Students have to attend minimum **70%** of total classes. Students have to enter the class within 15 minutes to get attendance in the class. After **15** minutes students **CAN** enter the class, however, he/she will get ‘**L**’ which means ‘late attendance’. After **3** late attendances it will be counted as **one** absent. Thus, students need to be careful about time.

# Tentative class plan:

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| --- | --- |
| Lecture number | Topic |
| Lecture 01 | Introduction |
| Lecture 02 | Bisection Method |
| Lecture 03 | False Position Method |
|  | **QUIZ 1** |
| Lecture 04 | Newton Raphson’s Method |
| Lecture 05 | Secant Method |
| Lecture 06 | Fixed Point Iteration |
|  | **QUIZ 2** |
| Lecture 07 | Gaussian Elimination |
| Lecture 08 | Gaussian Elimination with partial Pivoting |
| Lecture 09 | Gauss Jordan Elimination |
|  | **MIDTERM** |
| Lecture 10 | LU Decomposition |
| Lecture 11 | Direct Method of Interpolation |
| Lecture 12 | Lagrange Method |
|  | **QUIZ 3** |
| Lecture 13 | Ordinary Differential Equation (Euler Method) |
| Lecture 14 | Simpson Rule |
| Lecture 15 | Linear Regression |
| Lecture 16 | …….. |
| Lecture 17 | …….. |
|  | **FINAL** |

# Marks Distribution:

|  |  |
| --- | --- |
|  | Marks |
| Quiz | 15 |
| Mid | 20 |
| Final | 30 |
| Assignment | 05 |
| Attendance | 05 |
| Lab | 25 |
| Total | **100** |

GOOD LUCK!!!!