Course Objectives

This course provides students with a strong background on various numerical techniques that have many real life applications; it provides basic theoretical knowledge of those techniques, and cover the relevant algorithms to implement those. Upon completion of this course, students are expected to:

- develop theoretical background of different scientific and engineering problem-solving numerical techniques.
- implement different numerical methods using any of the programming platforms (C, Matlab, Python etc.).

Course Name	Numerical Methods
Instructor	Md. Shahriar Karim (MSK1)
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Office Hours	TBA
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Text Books

- Numerical Analysis: Rechard L. Burden and J. Douglas Faires, 9th Edition
- Introductory Methods of Numerical Analysis, S. S. Sastry, 3rd or 4th Edition

Grading Policy

Course grading policy will follow the standard breakdown as used in NSU. However, curving may be applied, if necessary.

Marks Distribution

Activities	**Percentage**
Attendance and participation	3 + 2 %
Homeworks	10 %
LAB	15 %
Quizzes	10%
Midterm(s)	30 %
Final Exam	30 %

Course Content

The core materials of the course evolve around the below topics:

No.	Topics	Relevant Methods	L
1	Math primers	Taylor's series, Differential Calculus, Convergence, Floating Point Arithmetic, and Errors, Matrices.	2
2	Rootfinding methods	Bisection method, False position Method, Fixed point iteration method, Newton-Raphson method.	3
3	Interpolation	Newton's divided difference method, forward and backward difference method, Lagrange's interpolation	3
4	Numerical differentiation	Formula of numerical differentiation, Derivativs using Newton's and Lagrange's formula.	3
5	Numerical integration	General quadrature formula, Trapezoidal rule, Simpson's rule, Romberg integration	3
6	Solution of Initial value problem	Euler's method, Modified Euler's method, Runge-Kutta method	4
7	Solution of system of linear equation	Direct method: Matrix inversion method, Gaussian elimination method; Gauss Jordan method, LU factorization method, iterative method: Jacobi method, Gauss-Seidel method.	4
8	Solution of boundary value problem	Finite difference method and its application in different areas	2

Course Policies

This course will strictly follow the " NSU Code of Conduct, Revised- 2018". However, a few important points you all should always remember, and follow, are as below:

- Students should attend class lectures and take necessary notes. Unless specified otherwise, homeworks are generally due at the beginning of the class.
- Failure to attend an exam or failure to submit an assignment on time receives zero except when it is unavoidable because of some genuine emergency (requires proofs). In case of emergency, students should contact the instructor before the exam or before the stipulated date of assignment.
- Copying assignments are **strictly prohibited**; instead, discussion among students are encouraged. Please note down names of your peer classmates who you discussed during homework assignments. However, as the exams will largely follow the questions patterns being asked in HWs, solving those problems alone may help you more during exams.
- Regrading requests for quiz, midterms should be conveyed within the 6 hours of the papers being returned in class.

- Unless the final grade is incorrectly computed, grade will NOT be changed once it is posted. There are no scopes of assigning additional works to improve your final grade.
- **Important**: No electronic device(except, calculator) is allowed during exams and quizzes.

Class Participation

- PIAZZA: Attendance is important, but it is also important that you remain active as a class. To facilitate your participation while staying at home or outside of your class, we will have a virtual set up at https://piazza.com/signup for queries and discussion related to the course materials. Your active participation is highly appreciated, and will be monitored as well by the course instructor to evaluate your class participation (≥ 2 % of your final grade)!