MA104 – Ordinary Differential Equations
(2025 Spring Semester)

Instructor: Projesh Nath Choudhury **Office:** AB-6/356
Email: projeshnc@iitgn.ac.in **Office hours:** Fri 4–5pm

Course associates: TBA. (There will be 10 tutorial sections and hence 10 course associates.)
Google classroom code: gwn2pa7

Course website: https://projesh.people.iitgn.ac.in/Teaching/MA104/MA104_2025.html

Course goals: This is a compulsory course for undergraduate first year students. In this course, the various methods for solving ordinary differential equations will be explored.

COURSE CONTENTS

(1) **First order ODE:** Geometric meaning, direction fields, separable and exact equations, integrating factors, linear equations, orthogonal trajectories; Existence and uniqueness of solutions.
(2) **Second order linear ODE:** General principles, equations with constant coefficients, Euler-Cauchy equations; Linear independence of solutions and the Wronskian.
(3) **Nonhomogeneous ODEs:** Method of undetermined coefficients, method of variation of parameters.
(4) **Higher order linear ODE:** General principles.
(5) **Series solutions:** Legendre's equation and the Legendre polynomials, Frobenius' method, the Bessel's functions.
(6) **Laplace transforms:** Definition and basic properties, inverse transform, linearity, transform of derivatives and integrals, differential equations, unit step functions, Dirac's delta function, shifting theorems, differentiation and integration of transforms, convolution, integral equations.

Textbooks

(1) E. Kreyszig, *Advanced Engineering Mathematics*. 10th Edition, John Wiley, 2011
(2) W.E. Boyce and R. DiPrima, *Elementary Differential Equations*. 8th edition, John Wiley 2005.

LECTURES AND TUTORIALS

- **Lectures:** Wed and Fri 10.00 – 11.20 am (Jasubhai Auditorium)
- **Tutorials:** Thu 10.00 – 11.20 am (AB 7/104, 7/105, 7/203, 7/204, 7/205, 7/206, 5/202, 5/203, 6/201, 6/202)

Tutorial and Assignments

Two types of problem sets will be posted in regular intervals: Tutorials and Assignments.

- **Tutorial problems:** There are 10 tutorial sections for this class. Each student will be assigned to a unique tutorial section. This allocation will soon be communicated. Every student should attend only that tutorial section which is assigned to him/her. The tutorial problems will be posted well in advance. It is the responsibility of the students to work on the problems before coming to a tutorial session.

- **Assignment problems:** Assignment problems will not be discussed in class. Students are expected to work out these problems and submit them by the appropriate deadline. Solutions to assignments will be provided after deadline.

Discussing in a group is allowed and encouraged; however, each student should hand in their independently written solutions, written in their own words. Mere copying of others' work is strictly prohibited.

POLICY FOR EVALUATION

- **Quiz:** 25%
- **Examination I:** 40%
- **Assignment:** 25%
- **Attendance:** 10%

ATTENDANCE POLICY

Class participation will help you in staying on track and developing a deeper understanding and interest in the subject. As a result, attendance at lectures will be recorded. The following is the policy for the marks based on the percentage in attendance:

% in Attendance	Marks
Above or equal to 70	10
50 to less than 70	5
Below 50	0

*If you miss a class due to medical reasons and want to record attendance for that day, you need to provide a medical certificate from the institute health center doctor stating that you are not fit to appear for the class on that day.

HONOR CODE

Students are expected to follow the Institute Honor Code at all times. Any suspected/alleged violations of the Honor Code will be investigated and may lead to disciplinary action, as per Institute policy.

GRADING POLICY

Relative grading policy will be followed.