

North South University

Department of Mathematics &

Physics (DMP)

MAT350: Engineering Mathematics

**Instructor**  : Prof. Dr. Mamun Molla

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Office time: MW (4:30pm to 5:00pm)

# First Order Ordinary Differential Equations:

Introduction to Ordinary Differential Equations (ODEs), Separable and Exact ODE, Linear and nonlinear ODE, mathematical modeling and applications of ODEs.

1. **Second-Order and Higher order ODEs:**

Homogeneous Linear ODEs of Second Order, Homogeneous Linear ODEs with Constant Coefficients, Euler–Cauchy Equations, Existence and Uniqueness of Solutions. Wronskian, Non-homogeneous ODEs, Homogeneous Linear ODEs, Linear independence, Wornskian. Homogeneous Linear ODEs with Constant Coefficients, Nonhomogeneous Linear ODEs. Modeling and Applications

1. **Systems of ODE**

System of ODEs, Phase plane method, Nonhomogeneous Linear Systems of ODEs

1. **Gamma and Beta Function**

Definition of Gamma and Beta Functions, Relation between Gamma and Beta Functions, applications of Gamma and Beta Functions

1. **Series Solutions of ODEs**

Power series method, Extended Power Series Method, Bessel’s Equation. Bessel Functions and general solution.

1. **Laplace Transformation**

Laplace Transformation and its inverse, linearity and shifting, Laplace transformations of derivatives and integrals, Initial Value Problems, unit step function, delta function and t-shifting.

1. **Fourier Series**

Periodic function and Fourier Series, Fourier coefficients and applications. Even and odd functions, Half range expression, Fourier integrals and transforms.

**Marks Distribution** : Attendance- 10%, Quizzes- 20%, Mid-Term-25%, Final Exam- 35% Assignment/Class performance/Assessment- 10% ---Total 100%

**Text Book**  1. A First Course in Differential Equations with Modeling and Applications, (10th Edition, Author-Dennis G. Zill.)

2. Advance Engineering Mathematics- Author: Erwin Kreyszig (10th edition)

**Note**: Full attendance will carry the bonus marks. Three quizzes and two assignments will be taken.

**\*\*\*\*\*\*\*\*\*\*\*\*\*\* No Make Up Exam \*\*\*\*\*\*\*\*\*\*\*\*\*\***

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