

MATH 3321
Engineering Mathematics

- 1. Introduction to Differential Equations**
 - 1.1 Basic Terminology
 - 1.2 n -Parameter Family of Solutions; General Solution; Particular Solutions
 - 1.3 Initial-Value Conditions; Initial-Value Problems

- 2. First Order Differential Equations**
 - 2.1 Linear Differential Equations
 - 2.2 Separable Differential Equations
 - 2.3 Extensions to Other First Order Equations
 - 2.4 Some Applications
 - 2.5 Direction Fields; Existence and Uniqueness
 - 2.6 *Some Numerical Methods

- 3. Second Order Linear Differential Equations**
 - 3.1 Introduction; Basic Terminology and Results
 - 3.2 Homogeneous Equations
 - 3.3 Homogeneous Equations with Constant Coefficients

Exam 1

 - 3.4 Nonhomogeneous Equations
 - 3.5 Nonhomogeneous Equations with Constant Coefficients; Undetermined Coefficients
 - 3.6 Vibrating Mechanical Systems
 - 3.7 Higher-Order Linear Differential Equations

- 4. Laplace Transforms**
 - 4.1 Introduction
 - 4.2 Basic Properties of Laplace Transforms
 - 4.3 Inverse Laplace Transforms and Initial-Value Problems
 - 4.4 Piecewise Continuous Functions, Part I: Laplace Transforms
 - 4.5 Piecewise Continuous Functions, Part II: Inverse Laplace Transforms
 - 4.6 Initial-Value Problems with Piecewise Continuous Nonhomogeneous Terms

- 5. Linear Algebra**
 - 5.1 Introduction
 - 5.2 Systems of Linear Equations; Some Geometry
 - 5.3 Solving Systems of Linear Equations, Part I
 - 5.4 Solving Systems of Linear Equations, Part II

Exam 2

 - 5.5 Matrices and Vectors
 - 5.6 Square Matrices; Inverse of a Matrix, Determinants
 - 5.7 Vectors; Linear Dependence and Linear Independence
 - 5.8 Eigenvalues and Eigenvectors

- 6. Systems of Linear Differential Equations**
- 6.1 Systems of Linear Differential Equations
 - 6.2 Homogeneous Systems
 - 6.3 Homogeneous Systems with Constant Coefficients, Part I
 - 6.4 Homogeneous Systems with Constant Coefficients, Part II

Exam 3

- 6.5 *Nonhomogeneous Systems
- 6.6 *Direction Fields and Phase Planes

* Optional Section