University of Houston
Department of Mathematics
MATH 3321: Engineering Mathematics

Prerequisite: MATH 1432: Calculus II

1. Introduction to Differential Equations
    - 1.1 Basic Terminology
    - 1.2 *n*-Parameter Family of Solutions; General Solution; Particular Solution
    - 1.3 Initial-Value Conditions; Initial-Value Problems
2. First Order Differential Equations
    - 2.1 Linear Equations
    - 2.2 Separable Equations
    - 2.3 Some Applications
    - 2.4 Direction Fields; Existence and Uniqueness
    - 2.5 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
    - 3.4 Nonhomogeneous Equations
    - 3.5 Nonhomogeneous Equations with Constant Coefficients; Undetermined Coefficients
    - 3.6 Vibrating Mechanical Systems
4. Laplace Transforms
    - 4.1 Introduction
    - 4.2 Basic Properties of Laplace Transforms
    - 4.3 Inverse Laplace Transforms and Initial-Value Problems
    - 4.4 Applications to Discontinuous Functions
    - 4.5 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
    - 5.4 Solving Systems of Linear Equations, Part 2
    - 5.5 Matrices and Vectors
    - 5.6 Square Matrices; Inverse of a Matrix and Determinants
    - 5.7 Vectors; Linear Dependence and Linear Independence
    - 5.8 Eigenvalues and Eigenvectors

6. Systems of First Order Linear Differential Equations
    - 6.1 Higher-Order Linear Differential Equations
    - 6.2 Systems of Linear Differential Equations
    - 6.3 Homogeneous Systems
    - 6.4 Homogeneous Systems with Constant Coefficients
    - 6.5 Nonhomogeneous Systems
    - 6.6 Some Applications
    - * Optional Section