MATH 3321
Engineering Mathematics

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

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

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

   Exam 1

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

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

   Exam 2

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

* Optional Section