



Catalog Description:

Ordinary differential equations, their series solutions, numerical methods, Laplace transforms, physical applications.

Prerequisite:

C- or better in 2153, 2162.xx, 2173, 2182H, or 4182H; or credit for 254.xx, 263.xx, 263.01H, or 264H.

Text:

Ordinary Differential Equations and their Applications, OSU custom edition, by Boyce, published by Wiley, ISBN 9781119934455

Topics List:

INTRODUCTION

- 1.3 Classification of Differential Equations
- 2.1 Linear Equations with Variable Coefficients

FIRST ORDER DIFFERENTIAL EQUATIONS

- 2.2 Separable Equations
- 2.4 Differences between Linear and Nonlinear Equations
- 2.5 Autonomous Equations and Population Dynamics
- 2.6 Exact Equations and Integrating Factors
- 2.7 Numerical Approximations: Euler's Method
- 2.8 The Existence and Uniqueness Theorem
- 2.9 First Order Difference Equations

SECOND ORDER LINEAR EQUATIONS

- 3.1 Homogeneous Equations with Constant Coefficients
- 3.3 Complex Roots of the Characteristic Equation
- 3.2 Solutions of Linear Homogeneous Equations; the Wronkian
- 3.4 Repeated Roots; Reduction of Order

Midterm 1

- 3.5 Nonhomogeneous Equations; Method of Undetermined Coefficients
- 3.6 Variation of Parameters
- 3.7 Mechanical and Electrical Vibrations
- 3.8 Forced Vibrations



THE LAPLACE TRANSFORM

- 6.1 Definition of the Laplace Transform
- 6.3 Step Functions
- 6.2 Solution of Initial Value Problems
- 6.4 Differential Equations with Discontinuous Forcing Functions
- 6.5 Impulse Functions
- 6.6 The Convolution Integral

Midterm 2

HIGHER ORDER LINEAR EQUATIONS

- 4.1 General Theory of nth Order Equations
- 4.2 Homogeneous Equations with Constant Coefficients
- 4.3 The Method of Undetermined Coefficients Material
- 4.4 The Method of Variation of Parameters

SERIES SOLUTIONS OF SECOND ORDER LINEAR EQUATIONS

- 5.1 Review of Power Series
- 5.2 Series Solutions near an Ordinary Point, Part I
- 5.3 Series Solutions near an Ordinary Point, Part II
- 5.4 Euler's Equation; Regular Singular Points

Midterm 3

- 5.5 Series Solutions near a Regular Singular Point, Part I
- 5.6 Series Solutions near a Regular Singular Point, Part II
- 5.7 Bessel's Equation