



Catalog Description:

Matrix theory, eigenvectors and eigenvalues, ordinary and partial differential equations.

Prerequisite:

2173 and either major in ENG, Physics, or Chemistry or permission of math department.

Exclusions:

Not open to students with credit for both (i) 2415 (415) or 2255 (255) and (ii) 2568 (568 or 571).

Text:

Part II: Elementary Ordinary & Partial Differential Equations, OSU custom edition, by Boyce, published by Wiley, ISBN: 9781119934462

Introduction to Linear Algebra, 5th edition, by Johnson, Riess and Arnold, published by Pearson, ISBN: 9780321628217

Topics List:

Part One = Matrix Algebra

Textbook sections from Arnold, Riess, and Johnson's *Introduction to Linear Algebra*, 5th edition

Chapter 1: Matrices and Linear Systems of Equations

Chapter 3: The Vector Space \mathbb{R}^n

Chapter 4: The Eigenvalue Problem

- 1.1 Introduction and Gaussian Elimination and Systems of Linear Equations
- 1.2 Echelon Form and Gauss-Jordan Elimination
- 1.3 Consistent Systems of Linear Equations
- 1.5 Matrix Operations
- 1.6 Algebraic Properties of Matrix operations
- 1.7 Linear Independence and Nonsingular Matrices
- 1.9 Matrix Inverses and the Properties
- 3.1-3.2 Review and Vector Space Properties in \mathbb{R}^n
- 3.3 Examples of Subspaces
- 3.4 Basis for Subspaces; Dimension

Midterm I



- 4.1 The Eigenvalue Problem for 2×2 Matrices
- 4.2 Determinants and the eigenvalue Problem
- 4.4 Eigenvalues and characteristic Polynomial
- 4.5 Eigenvectors and Eigenspaces
- 4.6 Complex Eigenvalues and Eigenvectors
- 4.7 Similarity Xformations and Diagonalization

Part Two = Systems of Linear Differential Equations

Textbook Sections from Boyce & DiPrima's Part II: Elementary Ordinary & Partial Differential Equations

Ch. 7: Systems of First Order Linear Equations (no lectures, but assigned as an independent class project)

Midterm 2

Part Three = Partial Differential Equations and Fourier Series

Textbook Sections from Boyce & DiPrima's Part II: Elementary Ordinary & Partial Differential Equations

- 10.1 Two point Boundary Value Problem
- 10.2 Fourier Series
- 10.3 The Fourier Convergence Theorem
- 10.4 Even and Odd Functions
- 10.5 Separation of Variables; Heat Conduction Equation
- 10.6 Other Heat Conduction Problems
- 10.7 The Wave Equation; Vibrations of an Elastic String
- 10.8 Laplace's Equation (optional)