Mathematics 2174 **3 credits** **Linear Algebra and**
Au, Sp **Differential Equations**

Catalog Description:
Matrix theory, eigenvectors and eigenvalues, ordinary and partial differential equations.

Prerequisite:
2153, 2173, or 254.xx; 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: 0321628217

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 4: The Eigenvalue Problem

1.1 Introduction and Gaussian Elimination
1.2 Solution Sets for Linear systems
1.3 Matrices and Echelon form
1.4 Consistent Systems of Linear Equations
1.6 Matrix Operations
1.7 Algebraic Properties of Matrix operations
1.8 Linear Independence and Nonsingular Matrices
Midterm 1

Cont.

4.1 The Eigenvalue Problem for 2x2 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
Ch. 10: PDE's and Fourier Series

7.4 Basic Theory of Systems of 1st Order Linear Equations
7.5 Homogeneous Linear Systems with Constant Coefficients
7.6 Complex Eigenvalues
7.8 Repeated Eigenvalues
Midterm 2

Part Three = Partial Differential Equations and Fourier Series

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)