MATH 450   Advanced Mathematics for Engineers I   Winter 2007

Course Syllabus

Text: "Advanced Engineering Mathematics", by Michael D. Greenberg, 2nd edition, Prentice Hall

The following is a list of the topics I intend to cover and the sections of the textbook that correspond to those:

Euler's Formula: $e^{i\theta} = \cos\theta + i\sin\theta$

Fourier Series and PDEs

Chapter 17: Fourier Series

17.1 Introduction

17.2 Even, Odd, and Periodic Functions

17.3 Fourier Series of a Periodic Function

17.4 Half- and Quarter-range Expansions

17.5 Manipulation of Fourier Series

17.6 Vector Space Approach

17.7 The Sturm-Liouville Theory

Chapter 18: Diffusion Equation

18.1 Introduction

18.2 Preliminary Concepts

18.3 Separation of Variables

Chapter 17 and 18 (cont'd): Fourier Integral and Transforms

17.9 Fourier Integral

17.10 Fourier Transform

18.4 Fourier and Laplace Transforms

Chapter 19: Wave Equation

19.1 Introduction

19.2 Separation of Variables; Vibrating String

19.3 Separation of Variables; Vibrating Membrane

19.4 Vibrating String; d'Alambert's Solution

Aditional Topic: First Order Hyperbolic PDEs and the Method of Characteristics

Chapter 20: Laplace Equation

20.1 Introduction

20.2 Separation of Variables; Cartesian Coordinates

20.3 Separation of Variables; Polar Coordinates

20.4 Fourier Transform

Complex Variable Theory

Chapter 21: Functions of a Complex Variable

21.1 Introduction

21.2 Complex Numbers and the Complex Plane

21.3 Elementary Functions

21.4 Polar Form, Additional Elementary Functions, and Multi-valuedness

21.5 The Differential Calculus and Analyticity

Chapter 22: Conformal Mapping

22.1 Introduction

22.2 The Idea Behind Conformal Mapping

22.3 The Bilinear Transformation

22.4 Additional Mappings and Applications

22.5 More General Boundary Conditions

22.6 Applications to Fluid Mechanics

Chapter 23: Complex Integral Calculus

23.1 Introduction

23.2 Complex Integration

23.3 Cauchy's Theorem

23.4 Fundamental Theorem of the Complex Integral Calculus

23.5 Cauchy Integral Formula

Chapter 24: Taylor Series, Laurent Series, and the Residue Theorem

24.1 Introduction

24.2 Complex Series and Taylor Series

24.3 Laurent Series

24.4 Classification of Singularities

24.5 Residue Theorem