Hunter College of The City University of New York

MATH 301 Mathematical Methods for the Physical Sciences 3 hrs, 3 cr

TEXT: Partial Differential Equations with Fourier Series and Boundary Value Problems by Nakhlé H. Asmar, 2nd edition; Prentice-Hall

Preview of Applications and Techniques

1.1 What is a Partial Differential Equation?
1.2 Solving and Interpreting a Partial Differential Equation

Fourier Series

2.1 Periodic Functions
2.2 Fourier Series
2.3 Fourier Series of Functions with Arbitrary Periods
2.4 Half-Range Expansions: The Cosine and Sine Series
2.5 Mean Square Approximation and Parseval's Identity
2.6 Complex Form of Fourier Series
2.7 Forced Oscillations
2.8 Proof of the Fourier Series Representation Theorem
2.9 Uniform Convergence and Fourier Series
2.10 Dirichlet Test and Convergence of Fourier Series

Partial Differential Equations in Rectangular Coordinates

3.1 Partial Differential Equations in Physics and Engineering
3.2 Modeling: Vibrating Strings and the Wave Equation
3.3 Solution of the One Dimensional Wave Equation ,The Method of Separation of Variables
3.4 D'Alembert's Method
3.5 The One Dimensional Heat Equation
3.6 Heat Conduction in Bars: Varying the Boundary Conditions
3.7 The Two Dimensional Wave and Heat Equations
3.8 Laplace's Equation in Rectangular Coordinates
3.9 Poisson's Equation: The Method of Eigenfunction Expansions
3.10 The Maximum Principle

Partial Differential Equations in Polar and Cylindrical Coordinates

4.2 Vibrations of a Circular Membrane: Symmetric Case

Sturm-Liouville Theory with Engineering Applications

6.2 Sturm-Liouville Theory