Math 105B : Advanced Mathematics for Science and Engineering II

California State University, Sacramento · Department of Mathematics & Statistics

We will be covering Fourier Analysis, Partial Differential Equations (PDEs) and, if time allows, Series Solutions of Ordinary Differential Equations (ODEs).

Catalog Description

Partial differential equations continued, complex function theory and its applications. **Graded**: Graded Student. **Units**: 4.0.

Prerequisites

Math 105A

Text

Advanced Engineering Mathematics, 10/e, by Erwin Kreyszig

Coverage

Chapters 4, and 11-12.

Assignments

A variety of reading and problem solving assignments will be part of the course.

Examinations

There will be regular midterm examinations and a comprehensive final examination for this course.

Course Outline

I. Fourier Series and Transforms

    A. Periodic functions, trigonometric series

    B. Fourier series

    C. Functions of arbitrary period

    D. Even and odd functions; half range expansions

    E. Complex Fourier series

    F. Forced oscillations

    G. Fourier transform

II. Partial Differential Equations

A. Vibrating string; 1D wave equation

B. Solution of the 1D wave equation by separation of variables

C. D'Alembert solution of the wave equation

D. 1D heat equation; solution by separation of variable and Fourier transform

E. 2D heat, wave, and Laplace's equation on rectangular domains

F. 2D heat, wave, and Laplaces equation on disks

G. Laplacian in cylindrical and spherical coordinates, and applications

III. Series solutions of ODEs; special functions (as time allows)

A. Power series & power series method

B. Legendre's equations & Legendre polynomials

C. Frobenius method

D. Bessel's equation & Bessel functions