Math 105A : Advanced Mathematics for Science and Engineering I

California State University, Sacramento · Department of Mathematics & Statistics

Catalog Description

Survey of second order linear differential equations, power series and Fourier series solutions, solution of partial differential equations by separation of variables. **Graded**: Graded Student. **Units**: 4.0.

Prerequisites

Math 32 and Math 45

Text

Advanced Engineering Mathematics, 10/e, by Erwin Kreyszig

Coverage

Chapters 7-10.

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. Matrices

    A. Complex numbers & complex plane

    B. Systems of linear equations & Gaussian elimination

    C. Matrix operations (addition, subtraction, multiplication)

    D. Inverse of a matrix

    E. Determinants

II. Linear Algebra

    A. Vector spaces

    B. Linear independence, basis, dimension

    C. Linear transformations

    D. Eigenvalues & eigenvectors

E. Inner product spaces; orthogonality

F. Symmetric, skew-symmetric, orthogonal, Hermitian & unitary matrices

G. Diagonalizing a quadratic form; Rayleigh's principle

H. Systems of ordinary differential equations

I. The phase plane; stability

III. Vector Calculus

A. Review of Parts of Math 32
  1. Dot & cross product
  2. Curves; tangents, arc length; velocity; acceleration
  3. Double & triple integrals
  4. Vector & scalar fields
  5. Gradient & directional derivative of a scalar field
  6. Divergence & curl of a vector field

B. Line integrals

C. Conservative vector fields

D. Green's theorem

E. Surface integrals; divergence theorem; Stokes' theorem