Course Outline

Department of Mathematics
and Statistics

Minnesota State University, Mankato

Math 422 Partial Differential Equations (4 semester hours)

Course Description:

This course presents the theory, computations and applications of partial differential equations and Fourier series.

Prerequisites: MATH 223 and MATH 321 with “C” (2.0) or better or consent

Learning Outcomes:

Students will be able to

1. Derive the transport, wave, and diffusion equations by physics laws
2. Classify the given second order linear partial differential equations
3. Solve boundary value problems for first and second order linear partial differential equations
4. Numerically solve boundary value problems using the finite difference and finite element methods

Course Content:

1. First-order linear partial differential equations
2. Solutions of first order linear partial differential equations - method of characteristics
4. Fourier series - separation of variables, convergence of Fourier series, even and odd functions and Gibb's phenomena.
5. Solutions of second order linear partial differential equations - Fourier analysis for problems with Dirichlet and Neumann boundary conditions

Textbook/Related Readings/Materials:

Strauss, Partial Differential Equations, an introduction
Boyce and DiPrima, Elementary Differential Equations and Boundary Value Problems
Churchill and Brown, Fourier Series and Boundary Value Problems
Pinsky, Introduction to Partial Differential Equations with Applications
Zill, Differential Equations with Boundary Value Problems