California State University, Northridge

MATH 592A: Topics in Applied Mathematics I, Spring 2008

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This course is an introduction to the basic theory of partial differential equations (PDEs), methods of their solution and applications to physical problems (heat conduction, elastic strings, membranes, etc.) We will mainly focus on the three basic types of linear second order PDEs, namely, elliptic, parabolic and hyperbolic, and introduce some of the techniques that are used to solve the important initial and boundary-value problems for such equations.

Text: Partial Differential Equations with Numerical Methods, by Larsson and Thomée, Springer, 2003.

Prerequisites: Multi-D calculus (Math 380/250), differential equations (Math 351/280), linear algebra (Math 262). Basic analysis (Math 350) would be helpful as would some knowledge of numerical methods and programming (MATLAB).

A tentative course outline (to be revised in the future)

- Chapter 1: Introduction
- Chapter 2: A two-point boundary-value problem
- Appendix A: Some tools from mathematical analysis
- Chapter 3: Elliptic equations
- Chapter 6: The elliptic eigenvalue problem
- Chapter 7: Initial-value problem for ODEs
- Chapter 8: Parabolic equations
- Chapter 11: Hyperbolic equations

Additional material on numerical solution of PDEs as well as nonlinear problems may be included.

Grading: 30% homework assignments, 30% projects, 40% final exam.

The percentages are generally translated into letter grades using the following scale: 90-100% A; 80-89% B, 70-79% C, 60-69% D, 0-59% F. This scale may be modified at the instructor discretion, but only to increase everybody's grades.