MATH 5321 Applied Partial Differential Equations

Section Number 001, Spring 2012

Course Number: 23394

Lecture: MW 4:00-5:20pm, 105 Pickard Hall(PKH)

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Office Hours: MW 2:00pm -3:30pm or by appointment.

Prerequisite: Analysis, a limited amount of ordinary differential equations.

Text: *Partial Differential Equations,* by Lawrence C. Evans

Course Description: We will provide in this course a wide-ranging survey of many important topics in the mathematical theory and application of partial differential equations (PDE), with particular emphasis on various modern approaches. In particular, we will study the theory for more general linear and nonlinear elliptic, hyperbolic, and parabolic equations and properties of their solutions, with examples drawn from physics, differential geometry, and applied science. Basic analysis tools include the Fourier transform, the theory of distributions, Sobolev spaces, energy methods, and techniques of harmonic and functional analysis.

Topics: 1. Representation formulas for solutions: the linear transport equation, Laplace's equation, the heat equation, the wave equation, and nonlinear first-order PDE. 2. Theory for linear PDE: Sobolev spaces, second-order elliptic equations, and linear evolution equations. 3. Theory for nonlinear PDE: the calculus of variations, nonvariational techniques, and system of conservation laws.

Requirements: Several Homework assignments.