Math 250 **Linear Partial Differential Equations** **Fall 2012**
Course Information

Block: J+ (Tuesday, Thursday 3:00-4:15)
Instructor: Scott MacLachlan
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Office hours: (Fall 2011) Thursday 10:00 - 12:00 and Friday 1:30-2:30
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Prerequisites: Math 135 or permission of the instructor.

Text: to be determined

Course description:

Partial differential equations are the principal language of mathematical science, and this course will provide the student with a working knowledge of that language. We shall derive and analyze the important prototypical linear partial differential equations for wave motion, diffusion, and potential theory. We shall learn how to classify partial differential equations, how to solve them using separation of variables and integral transforms, and how to prove that solutions exist and are unique.

Along the way, we will learn why a piano sounds different from a harpsichord, how membranes and beams vibrate, and why wine should be stored in deep cellars. The mathematical tools that we will master include elements of vector calculus, linear algebra, ordinary differential equations, Sturm-Liouville problems, special functions, Fourier series, eigenfunction expansions, Fourier transforms, and Green's functions.

Math 250 differs from Math 151 in that it covers this material at a deeper level. Notably, we will study the theory of existence and uniqueness of solutions to PDEs, and we will study the necessary functional analysis and calculus of variations needed for this.