Partial Differential Equations
Math M442, Spring 2008

Professor:
Chris Judge
Rawles Hall Room 241
855-2353
cjudge@indiana.edu
http://mypage.iu.edu/~cjudge/

Office Hours: Tuesday 5-6 pm, Thursday 5-6 pm, and by appointment (subject to change)

Text: *Elementary applied partial differential equations*, by Richard Haberman. At times, we will venture outside the text. In these cases, notes will usually be provided.

Prerequisites: partial differential equations (M441) ordinary differential equations (M343) and linear algebra (M301 or M303). Check with instructor if you're not sure that you meet the prerequisites.

Description: It is remarkable that many physical phenomena can be described by simple equations involving partial derivatives. For example, as a function of space $\vec{x} = (x_1, x_2, x_3)$ and time t, the temperature T of a perfectly homogeneous medium satisfies the following

$$\frac{\partial T}{\partial t} = \frac{\partial^2 T}{\partial x_1^2} + \frac{\partial^2 T}{\partial x_2^2} + \frac{\partial^2 T}{\partial x_3^2}. \tag{1}$$

However simple their form, partial differential equations are notoriously difficult to solve. Indeed, in general one can only hope for qualitative information about the solutions. In this course, we will look at a variety of basic methods for dealing with these equations including:

- more separation of variables
- Sturm-Liouville methods
- Green's functions
- Fourier, Laplace, and or Radon transform
- calculus of variations (time permitting)

Grading: There will be two regular exams and a final. Homework will be assigned, collected, and graded on a weekly basis. The relative proportions of these activities as they count towards the final grade is as follows:

- homework: 30%
- regular exam 1: 20%
- regular exam 2: 20%
- final exam: 25%
- class participation: 5%

The scale $90^+ = A$, $80^+ = B$, etc., applies to the cumulative score.