Introduction to Partial Differential Equations

8:00-8:50am

CB347

Fall 2012

Instructor: Russell Brown

Office: POT741

Phone: 257-3951

rbrown@uky.edu

Office Hours: MWF2-2:50pm

and by appointment.

Grading: Grades will be based on written homework, oral presentations of homework, a mid-term exam and a final. The homework will be worth 40 points, presentations will be worth 10 points, and each of the exams will be worth 25 points. Collaboration will be encouraged on the homework.

Text: *Partial Differential Equations, 2nd edition, Craig Evans*

The course will serve as an introduction to the rigorous mathematical theory of partial differential equations. The first semester will concentrate learning about several basic examples, first order equations, Laplace's equation, the heat equation and the wave equation. Students will begin to learn about the properties of solutions of these equations in order to develop intuition as to what results hold for generalizations of these equations. The second semester will concentrate on the modern theory of elliptic equations, equations which generalize Laplace's equation. The course will also review (introduce?) many facts from advanced calculus as they are needed.

I expect to cover the bulk of Chapters 1–4 this fall. We will concentrate on the material in Chapter 2 and pick and choose topics from Chapters 3 and 4.

Homework: Homework will be assigned and collected regularly. You should endeavor to write out your homework clearly. Use complete sentences. Refer to facts from the text by giving page or result numbers. Note that homework is a substantial fraction of your grade.

Be aware that your instructor is old and cranky. Late homework will not be accepted. You may only write on one side of a paper. Leave generous margins. I may use the margins and the back of each sheet for comments. You may also find that your instructor is a bit distracted. Please ask if you to not understand my comments. You may write your homework out by hand.

We will devote part of class time to presentations by students. These presentations will be graded on mathematical correctness and ability to communicate mathematics.

Assignments will be collected at

`http://www.math.uky.edu/~rbrown/courses/ma533.f.12/`.

A number of other textbooks cover the material of this course. Three[1] of my favorites are:

- Michael Taylor, *Partial Differential Equations vol. I–III.*

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[1]There two kinds of mathematicians, those who know how to count and those who don't know how to count.

- Fritz John, *Partial Differential Equations.*

- G.B. Folland, *Introduction to Partial Differential Equations.*

- David Logan, *Applied Partial Differential Equations (Undergraduate Texts in Mathematics).*

- H.F. Weinberger, *A First Course in Partial Differential Equations With Complex Variables and Transform Methods.*

Approximate Schedule:

Chapter 1, Introduction	22 August–12 September.
Chapter 2, Four basic equations	14 September–19 October
Midterm exam	22 October
Chapter 3, Nonlinear first order partial differential equations	24 October–14 November
Chapter 4, Representation of solutions	16 November–7 December.

Undergraduate and graduate students may enroll in MA 533 and, in accordance with SACS guidelines, appropriate standards will be used to evaluate the work of each group of students. Since, to the best of my knowledge, no undergraduate students have enrolled in this course in the past twenty years, we do not include a separate statement of the expectations for undergraduate students in the syllabus.

August 21, 2012