INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS
MA 483G – Fall 2011

[Note: I reserve the right to change or amend this syllabus as I deem necessary, at any
time, and for any reason.]

Basic Information

- **Time and Place:** MWF 12:00–12:50 p.m. in CB 345.
- **Instructor:** Prof. Michel Jabbour, 729 POT, ext. 7-8836, jabbour@ms.uky.edu.
- **Office Hours:** MWF 2:00–3:00 p.m. (or by appointment) in 729 POT.
- **Exams:** There will be two in-class and one take-home exams. Whereas each
  in-class exam will last 50 minutes, the duration of the take-home exam will be two
  hours. The exact dates of the in-class exams will be announced one week in advance;
  they will depend on the pace at which the class will move, but tentative dates are 30
  September for the first exam and 31 October for the second exam. The cumulative
  take-home exam will be distributed one week before its due date. You will have the
  freedom to take it any time during this week, as long as you do not exceed the allotted
  two hours. A tentative due date for the take-home exam is 02 December; the exact
date will be confirmed by 18 November.

  You are expected to work on the take-home exam on your own and to follow all
  instructions regarding the exam as specified by the instructor. You are not allowed to collaborate on the take-home exam with other students. No makeup exams will be
  given unless your absence is due to a documented illness.

Material

- **Textbook:** Partial Differential Equations. An Introduction (2nd ed.) by Walter A.
  Strauss, Wiley.

- **Abstract and Prerequisites:** This is a one-semester introductory course in partial
  differential equations (PDE’s). You are expected to have a working knowledge of
  calculus, including basic facts about: continuous and differentiable functions of one
  and multiple variables; vector fields; infinite series of functions; derivatives of inte-
grals; curves and surfaces in three-dimensional space; and Green’s and the divergence
  theorems. (For a brief review, see the appendices in the textbook by Strauss.) An
  elementary knowledge of linear ordinary differential equations (ODE’s), particularly
  those with constant coefficients, is also expected. A certain amount of mathematical
  rigor will be implemented. Specifically, significant results will be stated as theorems
  and careful proofs will be given where needed. Roughly, emphasis will be placed
on the general properties of linear PDE's and techniques for obtaining solutions of initial-boundary value problems (IBVP's) that appear in the natural sciences and engineering. In particular, the classical diffusion, wave, and Laplace equations will be studied at some length.

- **Topics:** We will cover parts of the following chapters of Strauss' textbook:
  - Chapter 1: Where PDE's Come From.
  - Chapter 2: Waves and Diffusions.
  - Chapter 3: Reflections and Sources.
  - Chapter 4: Boundary Problems.
  - Chapter 5: Fourier Series.
  - Chapter 6: Harmonic Functions.
  - Chapter 7: Green's Identities and Green's Functions.
  - Chapter 12: Distributions and Transforms.
  - Chapter 13: PDE Problems From Physics.

**Attendance, Homework, and Quizzes:**

- **Attendance:** You must be present at, prepared for, and engaged in class each lecture. If you need to miss class for some reason, please notify me ahead of time.

- **Homework:** Problem sets will be assigned at the end of each section that we cover in class but shall not be graded. The purpose of these assignments is for you to develop the necessary technical skills for solving PDE's, but also to sharpen your understanding of the underlying mathematical structure of the subject. *In order to be best prepared for the quizzes and exams, you should diligently attempt to solve all assigned problems.* You are encouraged to discuss homework problems with each other; however, do not let cooperation degenerate into one person solving the problems and other people copying his/her answers.

- **Quizzes:** We will have in-class quizzes periodically. Dates will be announced in class one week before each quiz. Makeup quizzes will not be given except in cases such as a documented illness.

**Grading and University Policies:**

- **Final Grade:** Attendance and the quiz average will count for 30% of your final grade, each of two in-class exams will count for 20%, and the take-home exam will represent 30%. The letter grade will be determined according to the standard scheme, i.e., the letter grade A would correspond to 90% and above, the letter grade B to a numerical grade between 80% and 89%, the letter grade C to a numerical grade between 70% and 79%, the letter grade D to an average between 60% and 69%, and the letter grade E to a numerical grade smaller or equal to 59%.
• **Academic Integrity and Classroom Demeanor:** All students are expected to follow the academic integrity standards as explained in the University Senate Rules, particularly Chapter 6, found at:

http://www.uky.edu/USC/New/SenateRulesMain.htm

Turn off all cell phones, pagers, etc. prior to entering the classroom. *The use of cell phones and other electronic devices during class is strictly prohibited.* An attitude of respect for and civility towards other students in the class and the instructor is expected at all times.