Partial Differential Equations	Instructor: Martin Jackson
MATH 302	Office: Thompson 602
Fall 2011	Phone: 879-3567
MTTF 11:00–11:50 Thompson 374	E-mail: martinj@ups.edu

Course overview This courses focuses on analysis of partial differential equations. Partial differential equations are used in modeling many real-world phenomena. Our analysis of partial differential equation problems will involve using tools from calculus, linear algebra, and ordinary differential equations as well as developing new tools. After successfully completing this course, a student should be able to formulate, analyze, and interpret partial differential equations models for a variety of real-world phenomena.

Prerequisites Calculus through multivariate, linear algebra, and ordinary differential equations are prerequisites for this course. We'll draw from each of these extensively so you will routinely be responsible for recalling ideas and skills from these courses.

Class sessions In class, we will discuss new material, respond to questions from reading the text, and work through problem. When we discuss new material, the focus will be on "the big picture." That is, we will look at new ideas in their simplest form and how these ideas fit together. Often, we will not consider details and variations in depth during a first pass through new material. Your mastery of the details will begin outside of class with a careful reading of the text and work on the assigned problems. We will address the details by responding to questions on the reading and by looking at problems. At times, you will be responsible for presenting problem solutions.

Text The course text is *Applied Partial Differential Equations*, 2nd edition, J. David Logan (Springer, 2004). Outside of class, you should read the relevant sections of the text carefully. This will generally include working through the reasoning of arguments and filling in steps that are omitted in calculations. You should keep a list of specific questions from the reading and find answers to those questions either in class, with me outside of class, or with study partners.

The textbook itself does not have answers or solutions to problems. I view this as a feature rather than a deficiency. The author does have solutions for some problems available online. In order to foster independence and self-reliance, you are forbidden from looking at the author's solutions (and any other solutions that might be available online or elsewhere).

Mathematical computing technology A solution of a partial differential equation is a function (of more than one variable) that describes how a quantity of interest varies with respect to two or more independent variables. Mathematical computing technology can be very useful in visualizing solutions of partial differential equations and in managing the calculations that are sometimes required. You will probably find it very helpful to master a mathematical computing package. In class, I will generally use *Mathematica* because this is the package I know best. There are many other suitable options. You are free to use mathematical computing technology of your own choice.

Problems The study of partial differential equations includes theory, computation, and application. Working on problems is essential in building understanding and skill. I will assign problems on which I expect you to spend considerable time and effort.

An important component of the course will be problem solution presentations. During the course, you will present problem solutions to the class. For each, your job will be to develop a solution to a given problem in advance and then to guide the class through your solution using an appropriate combination of board work, handouts, and computing technology. Your problem solution presentations will be assessed in terms of both technical content and presentation style.

Exams Exams will be biweekly on a take-home basis. In most two-week periods of the semester, you will get a take-home exam typically consisting of one or two problems. We will have a total of 6 or 7 exams in the semester. You will work independently on exam problems. You will be allowed to use the course text and your class notes. You will not be allowed to consult other sources. You should not discuss generalities or specifics of exam problems with anyone except me.

For each exam problem, you will submit a complete and concise write up of your work showing enough detail so that a peer could follow your work (both computations and reasoning). This will generally require some prose to guide a reader through your work. For many problems, you will want to provide carefully considered and executed visualization aids.

The last of these exams will be due at the time of final exam period scheduled for this course (Friday, December 16 by 2:00 pm).

Course grades To determine course grades, I will drop your lowest exam score from among all but the last exam and then calculate a total course score with exams weighted at 85% and problem solution presentations weighted at 15%. I assign a preliminary course grade based on an objective standard (93.3-100% for an A, 90.0-93.2% for an A–, 86.7-89.9% for a B+, 83.3-86.6% for a B, etc.). I then look at each student's performance subjectively. Occasionally I will assign a course grade that is higher than the objective standard. For example, if a student has a grade of B according to the objective standard but has shown steady improvement, I might assign a course grade of B+.

Course web site Web pages for this course are located at

`math.pugetsound.edu/~martinj/courses/fall2011/m302/m302.html`

You can get to this by going to `math.pugetsound.edu/~martinj` and following the obvious links. On the course web site, I will maintain a list of assignments and due dates along with a list of daily topics and relevant sections of the text. I will also post announcements and comments about questions or issues that come up in class. You should check the web site for new announcements several times each week. Class handouts will be available to download as PDF files in case you lose your copy or miss class.

Office hours and appointments I am generally available in my office for help several hours each day. I am often in my office during the day in hours at which I do not have a scheduled class, meeting, or other activity. You can see my weekly schedule at

`math.pugetsound.edu/~martinj/schedule.html`

Feel free to come look for me. To be (almost) guaranteed that I will be in, come during one of the hours labeled as an "office hour." You can also call, send e-mail, or stop me after class to schedule an appointment for a specific time.

Important dates for Fall 2011 Please note the following important dates:

Tuesday, September 6	Last day to add a course
Monday, September 12	Last day to drop a course without record
Monday, October 10	Last day to drop a course with an automatic W

Note that University policy mandates a grade of WF if you drop a course after Monday, October 10 unless "there have been exceptional circumstances beyond the student's control and the student's work has been of passing quality." For full details, see the Academic Handbook (available on-line).

Emergency procedures Please review university emergency preparedness and response procedures posted at `www.pugetsound.edu/emergency/`. There is a link on the university home page.