Math 7313, Spring 2015
Partial Differential Equations I

Course Information
26128  Math 7313.501  TuTh 5:30pm-6:45pm  CB3 1.304

Professor Contact Information
Instructor: John Zweck
Office: FO 3.704J
Email: zweck@utdallas.edu
Webpage: I will maintain a web page for the course, linked from my web page http://www.utdallas.edu/~zweck. Bookmark it! I will also communicate with you using a class email list. (I do not use eLearning.)
Phone: (972) 883-6699 (Do not leave a message. Email me instead.)
Office Hours: Tu 11-11:50, and by appointment. If you cannot come to my office hours please contact me in class or by email to set up a time to meet. Also, you are encouraged to ask me questions by email.

Course Pre-requisites
MATH 6301 (Real Analysis) and MATH 6315 (Ordinary Differential Equations), or equivalent.

Course Description

More specifically, topics to be covered will include:

- **General concepts**: Linearity, well-posedness, initial and boundary value problems.
- **Diffusion**: The heat equation; classical solutions via Fourier series and separation of variables; existence and uniqueness of solutions; fundamental solutions; solution of non-homogeneous diffusion equation via Duhamel’s method.
• **Introduction to the Theory of Distributions**: Test functions, distributions, examples; applications to PDE’s.

• **The Laplace/Poisson Equation**: Uniqueness of solutions, Properties of harmonic functions (mean value theorem, maximum principle, smoothness of solutions, Liouville’s theorem); Fundamental solutions; Green’s functions and representation formulae for solutions of Dirichlet and Neumann problems.

• **First order equations and scalar conservation laws**: Linear transport equation; Semi-linear and quasi-linear equations and the method of characteristics; Burger’s equation, shocks, and traffic dynamics.

• **Waves and Vibrations**: Type of waves; derivation of the wave equation; uniqueness of solutions; d’Alembert’s formula; solution of non homogeneous equation via Duhamel’s method, Kirchoff’s formula.

• **Regularity theory**: An introduction Sobolev spaces and regularity theory for elliptic equations [if time permits].

**Required Textbooks and Materials**

The required text for the course is the one by Salsa, referenced below. The following texts on Partial Differential Equations are all recommended and represent a range of perspectives and levels of sophistication.


1The text is available on-line through the UTD Library
Academic Calendar and Assignments

The Lecture Notes and Homework Assignments are available on my web page. Homework problems for material covered on Th, Tu will be due at the start of class the following Tuesday. Most of the problems will be graded. Make sure your homework paper is stapled.

Grading Policy

Grades: Homework 40%, Midterm 30%, Final 30%
Midterm Exam: There will be one in-class midterm exam on Thursday Feb 26th.
Final Exam: Take-home exam due Friday May 8th at 10am. The final will be based on the whole course.

Instructor Policies

Homework

*No late homework will be accepted!* Your lowest two homework grades will be dropped.
You may ask me questions about the homework and you may collaborate with another student in the class. In fact you are encouraged to do so! However the final write up is your own – *two identical homework papers will both be given zero.*

Making up an exam you missed

If you miss one of the exams you may be given the chance to take a make up exam. To request a make up you should contact me no later than 48 hours after the exam time. Generally speaking, you will be offered a make up if you are sick or if a close relative or friend is gravely injured/sick or dies. However I will listen to all reasonable requests. Be prepared to bring appropriate evidence in support of your request.

Academic Integrity

I will be vigorous in reporting all instances of cheating to the University administration. See http://www.utdallas.edu/deanofstudents/dishonesty/

UT Dallas Syllabus Policies and Procedures

The information at http://go.utdallas.edu/syllabus-policies constitutes the University’s policy and procedures segment of the course syllabus.

*The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor*.