Math 3150-001: Partial Differential Equations for Engineers
Spring 2012

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Time and Place: M., W., 10:45-11:35, WEB L102

Partial differential equations (PDE) are a type of differential equation, i.e., a relation involving an unknown function (or functions) of several independent variables and their partial derivatives with respect to those variables. PDEs are used to formulate, and thus aid the solution of problems involving functions of several variables.

PDEs are for example used to describe the propagation of sound or heat, electrostatics, electrodynamics, fluid flow, and elasticity. These seemingly distinct physical phenomena can be formalized identically (in terms of PDEs), which shows that they are governed by the same underlying dynamic. PDEs find their generalization in stochastic partial differential equations. Just as ordinary differential equations often model dynamical systems, partial differential equations often model multidimensional systems.

Wikipedia: Partial differential equation

Text: Partial Differential Equations with Fourier Series and Boundary Value Problems by Nakhle Asmar, Prentice-Hall, 2005; Second Edition. Sections: 1.1, 1.2; 2.1 - 2.4; 3.1 - 2.9; 4.1 - 4.4; 7.1 - 7.4

Office Hours: F 10:00-12:00 pm, or by appoitment.

Tutoring Center: Free tutoring is available in the T. Benny Rushing Mathematics Center, located between JWB and LCB.

Prerequisite: Calculus series, ODE, Linear Algebra.

Grading: The course grade will be based on weekly homework (40%), three midterm exams (30%), and a final comprehensive exam (30%).

- Homework: weekly assignments will be posted on the web each WEdnesday and they will be collected after one week. No late homework will be accepted, unless requested and approved in advance, in extreme circumstances.
- Midterms: there will be three 50 minute midterm exams. Under special circumstances, arrangements can be made to take the exam at an earlier time, but no makeup exam will be given.
- Final Exam: Thursday, May 3, 2012 10:30 am 12:30 pm. The final exam is a comprehensive exam, covering all materials in the semester.

Table 1: Syllabus

1	1.1-1.2	Introduction
2	2.1-2.2	Periodic Functions and Fourier Series
3	2.3-2.4	More on Fourier Series
4	3.1	Examples in Physics and Engineering, Midterm 1
5	3.2-3.3	One Dimensional Wave Equation
6	3.4	D'Alembert Method
7	3.5-3.6	One Dimensional Heat Equation
8	3.7	Two Dimensional Equations, Midterm 2
9	3.8-3.9	Laplaces and Poissons Equations
10		Spring Break
11	4.1-4.2	Circular Coordinate and Vibration
12	4.3-4.4	Laplaces Equation in Circular Regions
13	4.4	Laplaces Equation in Circular Regions, Midterm
14	7.1	Fourier Integral Representation
15	7.2-7.3	Fourier Transform
16	7.4-7.5	Heat Kernel and Poisson Integral Formula

- Exam Policies: All the midterm and final exams will be closed books. You are allowed to bring an index card with your own handwritten notes. Laptops, PDAs, and wireless devices are not allowed in exams.

Homework

- HW1. Section 1.2: Problems 5, 11, 16. Section 2.1: Problems 2, 9, 12, 14, 19.
- HW2. Section 2.2: Problems 5, 11, 15. Section 2.3: Problems 4, 17. (You may use Maple)