Time and Place: TuTh 8:00-9:15, SMLC-120

Instructor: Mohammad Motamed

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Office: SMLC-216

Office Hours: 1) M 08:30-10:00   2)Th 13:30-15:00   3)by appointment

WWW: http://www.math.unm.edu/∼ motamed/Teaching/S15/312/math312S15.html

Prerequisites: MATH 264 (Calculus III), MATH 316 (Applied Ordinary Differential Equations)

Text: Richard Haberman, *Applied Partial Differential Equations with Fourier Series and Boundary Value Problems*, 5th Edition, Pearson (RH)

Description: The behavior of many physical systems can be mathematically modeled by partial differential equations (PDEs). Examples appear in the description of flows in porous media, behavior of living tissues, combustion problems, deformation of composite materials, earthquake motions, etc. In this course we will study different analytical methods for solving PDEs with a wide range of applications in science and engineering, including heat equation, wave equation, and Laplace equation. If time allow, we will also study numerical methods for computing approximate solutions of PDEs. Numerical studies are often needed when deriving explicit formulas for solutions is not possible.

Outline: We will cover parts of the following topics in the text book RH. Additional topics may be covered, at the instructor's discretion, depending on time and student interest.

- Ch. 1: Heat equation

- Ch. 2: Method of separation of variables

- Ch. 3: Fourier series

- Ch. 4 & 12: Wave equation and method of characteristics

- Ch. 7: Higher dimensional PDEs

- Ch. 8: Non-homogeneous problems

- Ch. 9 & 11: Green's functions for PDEs (*if time allows*)

Grading: Your grade for this course is based on homework, two midterm exams, and the final, in the following proportion:

- Homework & quizzes 40%

- Two midterm exams 30% (15% each)

- Final exam 30%

Homework & **Quizzes:** Each homework will consist of a number of questions from the textbook. You need to hand in a written report on the due date in class. Refer to lecture 1 for instructions on how a report should look like. Late homework is not accepted. You are encouraged to work with each other on the homework, but you must hand in each report in your own handwriting and your own words. Quizzes will be close to homework problems.

Exams: We will have two mid-term exams and one final exam (in class). The exam problems will be very similar to the homework problems and practice problems, which will be provided a few weeks before each exam. In almost all cases, a missed exam will simply be awarded zero points. In some very special cases, I may be willing to make alternative arrangements. If at all possible let me know well in advance that you might miss an exam and, if you have a valid reason, I'll see what I can do. Only in extreme circumstances will a student be allowed to make up an exam that was missed without prior arrangements.

American Disabilities Act: In accordance with University Policy 2310 and the American Disabilities Act (ADA), students who need academic accommodations and/or assistance in emergency evacuations should contact me as soon as possible to ensure their needs are met in a timely manner.

Disclaimer: I reserve the right to make reasonable and necessary changes to the policies outlined in this syllabus. An up-to-date copy of the syllabus can always be found on the course website (check it regularly on the course website). It is **your responsibility** to know and understand the policies discussed therein and to be up-to-date. If in doubt, ask questions.