Math 322 - 001 Syllabus
Applied Mathematical Analysis (Introduction to Partial Differential Equations)
MWF 12:05-12:55 in Van Hise 115

Textbook: *Applied Partial Differential Equations with Fourier Series and Boundary Value Problems*, Richard Haberman, 5th Edition, Pearson.

Pre-requisites: Math 319; Math 321; recommended: Math 340 or Math 320.

Professor: Leslie Smith, Departments of Mathematics and Engineering Physics, Office Hours in Van Vleck 825 M 1:15-2:15, W 3:30-4:30, lsmith@math.wisc.edu, http://www.math.wisc.edu/~lsmith.

Midterm Exams: There will be two in-class exams: **Monday October 10 and Monday November 14**. Please plan accordingly. Each exam is 25% of the final grade.

Final Exam: Saturday December 17, 5:05 - 7:05 PM, 35% of grade.

Piazza: There will be a Piazza course page to facilitate peer-group discussions. Please consider this resource mainly as a discussion among students. The instructor will check in a few times per week. **Piazza Sign-Up Page:** piazza.com/wisc/fall2016/math322

Piazza Course Page: piazza.com/wisc/fall2016/math322/home

Weekly Problem Sets: Homework is **due at the beginning of class**, normally on Friday. Homework problems will be selected from the book, and will be available on-line at www.math.wisc.edu/~lsmith approximately one week prior to the due date.

Please write your name clearly on each homework set, stapled please! Unstapled homework will not be accepted.

Grading of Homework: A grader will grade a subset of the homework problems given out each week, with some points also given for completeness. The homework scores will count for 15% of the grade. The lowest homework score will be dropped.

Late Policy: Homework turned in after the beginning of class will be considered late and will be graded at 80% credit. Late homework will be accepted until 5 PM on the due date (no credit thereafter, no exceptions). The policy is intended to keep everyone as current as possible.

Please email the instructor directly **before the due time/day** to make arrangements regarding late homework submission.

Expectations In Class: You are required to come to class. Some classes may involve student participation such as discussion, group work, student presentation of material, etc.

If you should need to miss a class for any reason, please let me know ahead of time, and make sure that you get notes and other important information from a classmate.

No cell phones, ipods, computers or other electronic devices may be used in class. In particular, please refrain from texting during class.

Find my mistakes in class, get brownie points!

Expectations Outside of Class: In order to fully understand the material and do well in the course, it is vital that you stay on top of your reading and homework assignments. The

six hours (minimum) of work outside class includes (but is not limited to) reading the texts (before and after the material is covered in lecture), completing/writing homework problems, and reviewing for exams. In addition, be prepared to work additional problems as needed, to formulate coherent questions for me and for your classmates, and to prepare material for discussion and or student presentation.

Grading Scale for Final Grade: 92-100 A, 89-91 AB, 82-88 B, 79-81 BC, 70-78 C, 60-69 D, 59 and below F

Course description: This is a first course in Partial Differential Equations. We will focus on the physical phenomena represented by three canonical equations – the Heat Equation, Laplace's Equation and the Wave Equation– and learn the mathematical solution techniques. A basic starting point for these linear equations is Separation of Variables, and we will learn how to construct Eigenfunction Solutions, starting in one space dimension and then in two and three dimensions. More advanced topics include Green's function solutions, Fourier Transform solutions, and the Method of Characteristics.

Course outline: The course covers most of the material in Chapters 1-5, and selected material from Chapters 7-10, 12 (time permitting). The topics are listed below with corresponding chapter.

Chapter 1: The Heat Equation

Chapter 2: Method of Separation of Variables

Chapter 3: Fourier Series

Chapter 4: Wave Equation: Vibrating Strings and Membranes

Chapter 5: Sturm-Liouville Eigenvalue Problems

Chapter 7: Higher-Dimensional Partial Differential Equations

Chapter 8: Non-homogeneous Problems

Chapter 9: Green's Functions for Time Independent Problems

Chapter 10: Infinite Domain Problems: Fourier Transform Solutions of Partial Differential Equations

Chapter 12: The Method of Characteristics