

Applied Analysis

Math 182, Spring 2005

Course Web Page: <http://zimmer.csufresno.edu/~doreendl/182.05s>

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Office hours: To be determined. Office hours will be posted on course web page.

Text: *Applied Partial Differential Equations with Fourier Series and Boundary Value Problems*, Fourth Edition, by Richard Haberman, Prentice Hall (2004) (required).

Units: 3.

Prerequisites: Math 81 or Math 123, and Math 171.

Meeting Time and Location: MWF 2-2:50, S2 210.

Course Description

Math 182 is the study of linear second order partial differential equations that originated in the 19th century physical models of heat transfer, fluid mechanics, acoustics, and electromagnetic field theory. Modeling with partial differential equations has expanded in recent times to include models in economics, biology, oceanography, and many other fields of study. The course will discuss some classical methods for solving partial differential equations, including separation of variables, Fourier series, and the method of characteristics. Applications of partial differential equations will also be discussed.

Course Objectives

To learn:

- some basic techniques for solving linear partial differential equations;
- how to identify a partial differential equation in order to determine which technique(s) can best be applied to solve it;
- the basic principles of Fourier series; and
- how to perform independent experiments using various technologies.

To continue learning how to:

- understand, construct, verbalize, write, and use mathematical arguments and reasoning in areas to which they apply (including, but not limited to, course work);

- evaluate the validity of an argument or of an approach to a problem; and
- perform independent experiments using various technologies.

Learning Outcomes

Upon completion of this course, students should be able to:

- classify partial differential equations;
- identify the best technique to solve an arbitrary linear partial differential equation; and
- apply the appropriate technique to solve a partial differential equation.

Grading

Your grade will be based on the following percentage weights: 20% for the homework, 15% for each midterm, and 35% for the final. Grades on each individual homework assignment and exam will be given as a total number of points out of a specified maximum. Your final grade in the class will be computed from your weighted average, scaled to a maximum of 100 points.

If your score on the final exam demonstrates significant improvement, then your lowest midterm score will be dropped and the final exam will be weighted 50%.

The tentative breakdown of points for the final grade is as follows:

Grade	Points, p
A	$p \geq 85$
B	$70 \leq p < 85$
C	$50 \leq p < 70$
D	$35 \leq p < 50$
F	$p < 35$

Exams

There will be three midterms and one final exam. The tentative schedule for these exams is

- Midterm 1: Wednesday, February 23.
- Midterm 2: Wednesday, March 30.
- Midterm 3: Wednesday, May 4.
- Final exam: Wednesday, May 18, 1:15-3:15 p.m.

Each midterm will be returned in the lecture following the exam, and the exam will be discussed at that time. If you wish to request a regrade, you must submit a signed written request and return your exam to the instructor before leaving class. No regrades will be allowed after you leave class, with the exception of mistakes in totaling scores. Permission

in advance is required to miss a midterm, in which case the final exam will count more. A missed exam is graded as a score of 0 unless prior arrangements are made with the instructor.

The final exam must be taken at the time listed above unless you receive permission from the instructor by the end of the second week of classes. In order to pass the class, you **must** take the final exam.

Attendance

Although attendance is not required, it is **strongly suggested** so that you may have the opportunity to ask questions regarding material presented in class, as well as to ask questions regarding the homework. The class time devoted to discussing homework problems will be limited, however, due to time constraints.

NOTE: You are responsible for checking the class web page **every** day for announcements.

Homework

Homework will be assigned approximately every lecture and due the Friday of the following week. All homework will be due by the end of the class period. More problems will be assigned than will be graded. The problems to be graded will be chosen by the instructor, but will not be announced until after the homework has been graded. Homework assignments will be announced in class and posted on the class web page. **No late homework will be accepted.**

Each week's homework should have at the top of the front page the number of the assignment (e.g., all homework assigned the first week should be called Homework #1). Also, the student's name and class should be written in the upper right-hand corner.

You are encouraged to discuss aspects of the course with other students, and you may discuss the homework assignments in general terms with others. You may not, however, copy any part of a problem and/or solution written by someone else. The instructor may be consulted for help in completing your assignments.

General Course Outline

A tentative schedule of the topics we shall cover and the chapters of the textbook in which these subjects can be found follows. However, each chapter listed below may not be covered in its entirety. In addition, material may be added or removed, depending on time constraints. Reading assignments will be announced in class and posted on the course web page.

Topic	Chapter in Haberman
Classification of partial differential equations	(class notes)
Derivation of the heat equation	Chapter 1
Method of separation of variables	Chapter 2
Fourier series	Chapter 3
Wave equation	Chapter 4
Sturm Liouville eigenvalue problems	Chapter 5
Method of characteristics	Chapter 12
Higher dimensional partial differential equations	Chapter 7
Nonhomogeneous problems	Chapter 8

Classroom Behavior

When the instructor is speaking, talking, whispering, or any other student conduct which disrupts the learning process will not be tolerated and may lead to disciplinary action and/or removal from class.

Any disruptive behavior in class that interferes with the learning environment will not be tolerated. University policies on disruptive behavior are followed and enforced in every instance.

Academic Dishonesty

Academic dishonesty will not be tolerated in any form. For more information on the University's policy regarding cheating and plagiarism, refer to the Class Schedule (Legal Notices on Cheating and Plagiarism) or the University Catalog (Policies and Regulations).

Students with Disabilities

University student disability policies are followed. Contact the Disabled Student Services office (located in the Madden Library) for specific arrangements and information.

Other Issues

For other required syllabus statements referring to the use of computers and copyright policy please see required syllabus policy statement page (<http://academicaffairs.csufresno.edu/assocprovost/RequiredSyllabusPolicyStatements.htm>).