

Partial Differential Equations

Math 182, Spring 2009

Course Web Page: <http://zimmer.csufresno.edu/~doreendl/182.09s>

Instructor: Doreen De Leon

Office: PB 350

E-mail: doreendl@csufresno.edu

Phone: (559) 278-4009 (x84009 on campus)

Office hours: W 3-4:15 p.m., Th 2-4 p.m., F 1-1:50 p.m. or by appointment

Text (required): *An Introduction to Partial Differential Equations* by Yehuda Pinchover and Jacob Rubinstein, Cambridge University Press (2005).

Units: 3.

Prerequisites: Math 81 or Math 123.

Meeting Time and Location: MWF 11-11:50 a.m., S2 206.

Course Description

Math 182 is the study of linear partial differential equations, many of which 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, as well as applications of partial differential equations.

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
- some qualitative properties of partial differential equations.

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) and how to evaluate the validity of an argument or of an approach to solving a problem.

Learning Outcomes

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

- classify partial differential equations;
- identify the best technique to solve an arbitrary linear partial differential equation;
- apply the appropriate technique to solve a partial differential equation; and
- be able to describe qualitative behavior of standard partial differential equations.

Grading

Your grade will be based on the following percentage weights: 25% for the homework, 15% for each midterm, and 30% 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. 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 45%. Your

final grade in the class will be computed from your weighted average, scaled to a maximum of 100 points.

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 25, 2009
- Midterm 2: Wednesday, April 1, 2009
- Midterm 3: Wednesday, May 6, 2009
- Final exam: Monday, May 18, 2009, 11:00 a.m.-1:00 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. The homework will be due in one packet on Friday of the following week by the beginning of the class period (i.e., by 11:00 a.m.). More problems will be assigned than will be graded. The problems to be graded will be chosen by the instructor each week, but will not be announced until after the homework has been graded. For full credit, homework solutions must follow the format set forth in *Communicating Mathematics through Homework*, which can be found at <http://zimmer.csufresno.edu/~doreendl/homework.html>. Homework assignments will be announced in class and posted on the class web page. **No late homework will be accepted.**

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 solution written by someone else.** You are also encouraged to consult the instructor for help in completing the assignments or for any other course-related questions.

General Course Outline

A tentative schedule of the topics to be covered 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 Pinchover and Rubinstein
Classification of partial differential equations and mathematical models	Chapter 1
First order equations	Chapter 2
Second order linear equations in two independent variables	Chapter 3
One-dimensional wave equation	Chapter 4
Method of separation of variables	Chapter 5
Sturm-Liouville eigenvalue problems	Sections 6.1-6.2
Elliptic equations	Chapter 7
Green's functions	Chapter 8

Classroom Behavior

Talking, whispering, or any other student conduct which disrupts the learning process will not be tolerated and may lead to removal from class and/or other disciplinary action. University policies on disruptive behavior are followed and enforced in every instance.

Academic Dishonesty

Academic dishonesty will not be tolerated in any form. The Honor Code, which requires all members of the CSU Fresno academic community to adhere to principles of academic integrity and mutual respect while engaged in university work and related activities, can be found at <http://www.csufresno.edu/aps/documents/apm/236.pdf>. You should:

- (1) understand or seek clarification about expectations for academic integrity in this course (including no cheating, plagiarism and inappropriate collaboration);
- (2) neither give nor receive unauthorized aid on examinations or other course work that is used by the instructor as a basis of grading; and
- (3) take responsibility to monitor academic dishonesty in any form and to report it to the instructor or other appropriate official for action.

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.

Computers

At California State University, Fresno, computers and communication links to remote resources are recognized as being integral to the education and research experience. Every student is required to have his/her own computer or have other personal access to a workstation (including a modem and a printer) with all the recommended software. The minimum and recommended standards for the workstations and software, which may vary by academic major, are updated periodically and are available from Information Technology Services (<http://www.csufresno.edu/ITS/>) or the University Bookstore. Students are presumed to have 24-hour access to a computer workstation and the necessary communication links to the University's information resources.

Copyright Policy

For the required syllabus statements referring to copyright policy, please see the Required Syllabus Policy Statements page (www.csufresno.edu/academics/policies_forms/instruction/RequiredSyllabusPolicyStatements.htm).