Syllabus
Partial Differential equations
MATH 4041

Course: 4041.001.

Course Title: Partial Differential Equations.

Time: MWF 13:00-13:50.

Place: Wachman Hall Rm 407.

Instructor: Mendoza, Gerardo A.

Instructor Office: Wachman Hall Rm 618.

Instructor Email: gerardo.mendoza@temple.edu

Instructor Phone: (215) 204 5053.

Course Web Page: http://www.math.temple.edu/ gmendoza

Office Hours: By appointment, but you can come any time, if I am in and I can see you, I will.

Prerequisites: Math 2101 (0147) or Math 2103 (0148) or Math 3051 and Math 3041 or Math 3045 with grades of C- or higher or transfer credit for these courses.

Textbook: J. David Logan, Applied Partial Differential Equations, 3rd Edition. Undergraduate Texts in Mathematics, Springer (ISBN 978-3-319-30769-5).

Course Goals: By the end of the course, you should be able to derive the classical partial differential equations in mathematical physics, understand the various possible initial and boundary value problems you can pose for these equations, and be able to solve them in special cases. You should also have a basic understanding of Hilbert spaces, orthonormal bases, and Fourier series. Finally, you should also have a working knowledge of the Fourier transform and its usefulness in solving partial differential equations.

Topics Covered: The aim of the course is to develop a practical understanding of basic aspects of Partial Differential Equations through studying the four basic linear equations of mathematical physics, the heat equation, Laplace's equation, the wave equation and Schroedinger's equation. These equations will be solved in specific situations using separation of variables and the companion method of Fourier transform. This will require us to study Fourier series (either as actual trigonometric series or more general series) in particular. All this will be developed as needed. Time permitting, we will undertake to study the so called WKB method (which produces approximate solutions). We will always keep present the physical meaning and applications of the equations, and, time permitting, we'll make a serious attempt at understanding the simplest model of the hydrogen atom. More formally, the course will cover: 1. First order partial differential equations, linear and non linear. An introduction to ordinary differential equations. 2. The fundamental models of the four classical differential equations of mathematical physics. Problems associated with them: initial and/or boundary value problems. 3. The method of separation of variables. Sturm-Liouville problems, spaces of functions, including an introduction to Hilbert spaces, Fourier series and Fourier transforms. 4. Solution of selected problems for the four classical PDE's. 5. Time permitting, a model for the hydrogen atom.

Course Grading: Evaluation: assigned homework and two take-home exams (50%+25%+25%). No final exam. For assigned homework, you are allowed to work in groups. But the paper you submit with your answers must be written alone, after all discussions with classmates (or others) are over. You must work alone on the take-home exams, but are allowed to consult any book, and with me (only). For both homework and exams I will require a clean and clear presentation of your work. Lack of a clean, clear exposition of your solution to a problem will result in 0 points for that problem.

Exam Dates: Due dates for take-home partial exams: February 21, April 25.

Attendance Policy: Attendance is required.

Any student who has a need for accommodation based on the impact of a disability should contact me privately to discuss the specific situation as soon as possible. Contact Disability Resources and Services at (215) 204-1280, 100 Ritter Annex, to coordinate reasonable accommodations for students with documented disabilities.

Freedom to teach and freedom to learn are inseparable facets of academic freedom. The University has adopted a policy on Student and Faculty Academic Rights and Responsibilities (Policy # 03.70.02) which can be accessed here.

Students will be charged for a course unless dropped by the Drop/Add deadline date. Check the University calendar for exact dates.

During the first two weeks of the fall or spring semester, students may withdraw from a course with no record of the class appearing on the transcript. In weeks three through nine of the fall or spring semester, or during weeks three and four of summer sessions, the student may withdraw with the advisor's permission. The course will be recorded on the transcript with the instructor's notation of "W," indicating that the student withdrew. After week nine of the fall or spring semester, or week four of summer sessions, students may not withdraw from courses. No student may withdraw from more than five courses during the duration of his/her studies to earn a bachelor's degree. A student may not withdraw from the same course more than once. *Students who miss the final exam and do not make alternative arrangements before the grades are turned in will be graded F.*

The grade I (an "incomplete") is reserved for extreme circumstances. It is necessary to have completed almost all of the course with a passing average and to file an incomplete contract specifying what is left for you to do. To be eligible for an I grade you need a good reason and you should have missed not more than 25% of the first nine weeks of classes. If approved by the Mathematics Department chair and the CST Dean's office, the incomplete contract must include a default grade that will be used in case the I grade is not resolved within 12 months.