MAP 6356 - Partial Diff Equa
MWF Period 4 (10:40am - 11:30AM) Room:LIT0223

Instructor: Cheng Yu, Little Hall 306, chengyu@ufl.edu

Office Hours: M,W: 11:45am-12:30am, or make appointment.

Textbooks: Partial Differential Equations by Evans.

Goal: This course offers an opportunity to deepen your understanding of PDEs, equipping you with valuable tools for tackling basic problems in both theoretical and applied contexts. By mastering these concepts, you will gain a solid foundation for advanced mathematics and engineering challenges.

Prerequisites: This course is tailored for graduate and advanced undergraduate students who have a strong background in advanced calculus, real analysis, and ode. Students should be familiar with concepts such as continuity, limits, differentiation, integration, and basic ODE-solving techniques. A strong mathematical background will be essential for engaging with the course material effectively. Proficiency in these areas will ensure that participants can confidently navigate the challenging topics and problem-solving strategies that will be explored throughout the course.

Description: This graduate course is specifically designed for students specializing in mathematics and engineering. Throughout the course, we will introduce the basic ideas of partial differential equations (PDEs). This includes discussions on representation formulas for solving various types of linear PDEs and delving into first-order nonlinear PDEs, along with methods for representing their solutions. The course will focus on the following key topics:

- Introduction
  - Data and Well-Posedness
  - Classifying PDEs
- Important linear PDEs
  - Laplace's equations: fundamental solution; Mean-value formulas;properties of harmonic functions; Green's function; energy method.
  - Heat equation: fundamental solution; Mean-value formulas;properties of solutions; energy method.
  - Wave equations: solutions by spherical means; nonhomogeneous problem; energy methods.
- Nonlinear first-order PDE
  - Transport equations and characteristic method.

– Introduction to conservation laws: Shocks, entropy condition; weak solutions, uniqunesss; Riemann's problem,.....

Homework assignments:

There will be a total of 5 challenging homework assignments throughout the course. While I encourage students to engage in discussions about the homework problems with their classmates, it's important that the solutions are written independently. Your own understanding and effort in solving these problems are key to your learning.

Exams: There will be one Mid-exam and one comprehensive final as follows
Midterm Exam: October 16.
Final Exam: announce later.

Grade Policy: Homework will account for 60 percent of the final grade, while the midterm exam and final exam will each contribute 20 percent. Additionally, class participation will be factored into borderline grade considerations. The grade scale is as follows:

A : $[85, 100]$.
B : $[75, 85)$.
C : $[70, 75)$.
C-:$[68, 70)$.
D : $[60, 68)$.
F : $[0, 60)$.

Students with Disabilities: Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Diversity and inclusion: I am committed to diversity and inclusion of all students in this course. I acknowledge, respect, and value the diverse nature, background and perspective of students and believe that it furthers academic achievements It is my intent to present materials and activities that are respectful of diversity: race, color, creed, gender, gender identity, sexual orientation, age, religious status, national origin, ethnicity, disability, socioeconomic status, and any other distinguishing qualities.