MTH 622 PARTIAL DIFFERENTIAL EQUATIONS - Winter 2019

CRN: 31464, Credit Hours: 3
Class Meetings MWF 1:00-1:50 pm in Rogers Hall 332

Instructor Elaine Cozzi

• Office: KIDD 308
• E-mail: cozzie@math.oregonstate.edu
• Phone: 737-4175
• Office Hours: Mon: 2:30-3:30 pm, Wed: 12:00-1:00 pm, Fri: 11:00 am-12:00 pm

Text Partial Differential Equations: An Introduction to Theory and Applications, by Shearer and Levy (required)

Course Webpage http://people.oregonstate.edu/~cozzie/MTH622W19.html
The first-day handout, homework assignments, and other course materials will be posted on the course webpage.

Course Description This course is the second of a three-course series (MTH 621-2-3) and serves as an introduction to the mathematical theory of partial differential equations (PDE). Specific topics include convergence of Fourier series solutions (as derived using separation of variables in MTH 621), the Fourier transform, Laplace’s equation, Poisson’s equation, properties of harmonic functions (including the mean value property and maximum principle), Green’s functions for boundary value problems, distributional solutions of PDE, and, time permitting, elliptic theory with Sobolev spaces. These topics are covered in Chapters 7-11 of the text.

Prerequisites MTH 621 [C] (unenforced).

Course Assessment Your overall grade will be determined by the following:

• Homework: 30%
• Midterm Exam: 30%
• Final Exam: 40%

Homework Homework will be due roughly every other Monday at the beginning of class, although you may occasionally have homework due on a Wednesday or Friday. The first assignment will be due on January 21 (tentative). You will have approximately five assignments throughout the term. You are encouraged to discuss homework problems with your classmates outside of class; however, you must write up and submit your own work.

Exams There will be one in-class midterm and a final exam. The midterm is tentatively scheduled for Monday, February 11. The final is cumulative and will be held on Monday, March 18, 2:00 PM - 3:50 PM. The midterm and final will be open book (Shearer and Levy only) and open class notes.
Learning Outcomes Upon completing MTH 622, the successful student is expected to be able to:

- analyze pointwise, uniform, and mean-square convergence of Fourier series (which arise when applying separation of variables).
- solve Poisson’s equation in $\mathbb{R}^n$ using the fundamental solution.
- state and prove properties of harmonic functions, and use these properties to analyze solutions to Poisson’s equation.
- apply separation of variables to solve Laplace’s equation on rectangular, spherical, and cylindrical domains.
- use Green’s functions to represent solutions to boundary value problems for elliptic equations.
- apply distribution theory to analyze non-smooth solutions to linear PDE.
- analyze existence and uniqueness of solutions to Poisson’s equation on bounded domains using methods from functional analysis and the theory of Sobolev spaces.

Statement Regarding Students with Disabilities Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Statement of Expectations for Student Conduct Students are expected to be familiar with Oregon State University’s Statement of Expectations for Student Conduct. Please review this statement at http://studentlife.oregonstate.edu/code