



MATH 4335 | Partial Differential Equations I

Section: 13866 | Face-to-Face

TuTh 08:30 AM-10:00 AM | University of Houston; Classroom and Business Bldg.; CBB 124

Prerequisite(s): MATH 3331, or equivalent, and three additional hours of 3000-4000 level Mathematics. Initial and boundary value problems, waves and diffusions, reflections, boundary values, Fourier series.

General Course Information

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Department: Mathematics

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Office Hours

Wednesday 1:00pm-2:00pm (PGH 602) and by appointment (send an email to instructor to confirm availability).

Course Objectives and Student Learning Outcomes

The main goal of this course is to introduce the notion of Partial Differentials Equations (PDEs), techniques for analyzing these equations and their use in the context of physical applications. See below for a exhaustive description of the material covered in this course.

Required Instructional Materials

Partial Differential Equations, Second Edition, by Walter Strauss, John Wiley & Sons, Inc. Pub.

ISBN: 978-0470054567

Course Schedule, Assignments, and Assessments

A tentative schedule will be made available on MS Teams when the semester starts.

Expect one exam late September, one late October and the final early December.

Assignments will be due (approximately) every other week for a total of 7-8 assignments.

Discussion and Lecture Topics

The following topics will be covered in class:

1. Review Ordinary Differential Equations and some notations.
2. Introduction of Partial Differential Equations (PDEs) (section 1.1-1.5)
 - Concept PDEs
 - Examples (transport, wave, diffusion equations)
 - Boundary value problem
 - Notion of well-posedness
3. PDEs on half and whole real line (chapters 2 and 3)
 - Wave equation and Diffusion equation on whole line
 - Maximum principle for Diffusion equation
 - Duhamel principle of Wave and Diffusion equations
 - Wave equation and Diffusion equation on half line
4. Boundary problems and separation of variables (section 4.1-4.3)
 - Introduction to method for 1-space dimension problems
 - Applications to Diffusion and Wave equations
 - Introduction to method for 2-space dimension problems
 - Application to Laplace equation on square and disk
5. Fourier Series (section 5.1-5.5)
 - Fourier coefficients and Fourier series
 - Orthogonality and Fourier Series
 - Completeness and Gibbs phenomena

If time permits, we may also cover the chapter 6 (Harmonic Functions) and see how to solve PDEs with the software Matlab (free for UH students, previous experience not needed).

Grading Rubrics and Weights

- 25 points for homeworks (around 7-8 homeworks for the semester). A random selection of homework problems will be graded from among those assigned.
- 25 points for each of two midterms (so 50 points total)
- 25 points for a final exam scheduled during last lecture on Wednesday 3rd December from 8:30am to 10:00am.

Summary: 25% for assignments and 75% for three exams (25% each).

Course Policies and Procedures

There is no extra credits.

The assignments and their due dates will be posted on Canvas and sent by email.

Assignment should be submitted via Canvas as one pdf file.

No email submissions will be accepted. There are no unjustified extensions.

Students should communicate with instructor via email and in person.

University Policies and Student Support Resources

Mental Health and Wellness Resources

The University of Houston has a number of resources to support students' mental health and overall wellness, including [CoogsCARE](#) and the [UH Go App](#). [UH Counseling and Psychological Services \(CAPS\)](#) offers 24/7 mental health support for all students, addressing various concerns like stress, college adjustment and sadness. CAPS provides individual and couples counseling, group therapy, workshops and connections to other support services on and off- campus. For assistance visit uh.edu/caps, call 713-743-5454, or visit a [Let's Talk](#) location in-person or virtually. Let's Talk are daily, informal confidential consultations with CAPS therapists where no appointment or paperwork is needed.

Need Support Now? If you or someone you know is struggling or in crisis, help is available. Call CAPS crisis support 24/7 at 713-743-5454, or the National Suicide and Crisis Lifeline: call or text 988, or chat 988lifeline.org.

Title IX/Sexual Misconduct

Per the UHS Sexual Misconduct Policy, your instructor is a “responsible employee” for reporting purposes under Title IX regulations and state law and must report incidents of sexual misconduct (sexual harassment, non-consensual sexual contact, sexual assault, sexual exploitation, sexual intimidation, intimate partner violence, or stalking) about which they become aware to the Title IX office (known at UH as the Equal Opportunity Services office or "EOS"). Please know there are places on campus where you can make a report in confidence. You can find more information about resources on the UH [Title IX/Sexual Misconduct Resources page](#). Please note that you may also report concerns of discrimination based on your protected class identity to EOS.

Reasonable Academic Adjustments/Auxiliary Aids

The University of Houston is committed to providing an academic environment and educational programs that are accessible for its students. Any student with a disability who is experiencing barriers to learning, assessment or participation is encouraged to contact the Justin Dart, Jr. Student Accessibility Center (Dart Center) to learn more about academic accommodations and support that may be available to them. Students seeking academic accommodations will need to register with the Dart Center as soon as possible to ensure timely implementation of approved accommodations. Please contact the Dart Center by visiting the website: <https://uh.edu/accessibility/> calling (713) 743-5400, or emailing jdcenter@Central.UH.EDU.

The [Student Health Center](#) offers a Psychiatry Clinic for enrolled UH students. Call 713-743-5149 during clinic hours, Monday through Friday 8 a.m. - 4:30 p.m. to schedule an appointment.

The [A.D. Bruce Religion Center](#) offers spiritual support and a variety of programs centered on well-being.

The [Center for Student Advocacy and Community \(CSAC\)](#) is where you can go if you need help but don't know where to start. CSAC is a “home away from home” and serves as a [resource hub](#) to help you get the resources needed to support academic and personal success. Through our [Cougar Cupboard](#), all students can get up to 30 lbs of FREE groceries a week. Additionally, we provide 1:1 appointments to get you connected to on- and off-campus resources related to

essential needs, safety and advocacy, and more. The [Cougar Closet](#) is a registered student organization advised by our office and offers free clothes to students so that all Coogs can feel good in their fit. We also host a series of cultural and community-based events that fosters social connection and helps the cougar community come closer together. Visit the CSAC homepage or follow us on Instagram: @uh_CSAC and @uhcupbrd. YOU belong here.

Women and Gender Resource Center

The mission of the [WGRC](#) is to advance the University of Houston and promote the success of all students, faculty, and staff through educating, empowering, and supporting the UH community. The WGRC suite is open to you. Stop by the office for a study space, to take a break, grab a snack, or check out one of the WGRC programs or resources. Stop by Student Center South room B12 (Basement floor near Starbucks and down the hall from Creation Station) from 9 am to 5 pm Monday through Friday.

Academic Honesty Policy

High ethical standards are critical to the integrity of any institution, and bear directly on the ultimate value of conferred degrees. All UH community members are expected to contribute to an atmosphere of the highest possible ethical standards. Maintaining such an atmosphere requires that any instances of academic dishonesty be recognized and addressed. The [UH Academic Honesty Policy](#) is designed to handle those instances with fairness to all parties involved: the students, the instructors, and the University itself. All students and faculty of the University of Houston are responsible for being familiar with this policy.

Excused Absence Policy

Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston [Undergraduate Excused Absence Policy](#) and [Graduate Excused Absence Policy](#) for reasons including medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused

absences, the approval process, and extended absences. Additional policies address absences related to [military service](#), [religious holy days](#), [pregnancy and related conditions](#), and [disability](#).

Recording of Class

Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the [Justin Dart, Jr. Student Accessibility Center](#). If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with anyone without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.