

Course Information

Course Number: Math612
Course Title: Partial Differential Equations
Section: 600
Time: MWF, 9:20-10:10
Location: BLOC 113
Credit Hours: 3

Instructor Details

Instructor: Emil Straube
Office: BLOC 601M
Phone:
E-Mail: straube@math.tamu.edu
Office Hours: MWF 3:00-4:00 or by appointment; all office hours will be online via Zoom until further notice

Course Description (Catalog)

Theory of linear partial differential equations; Sobolev spaces; elliptic equations (including boundary value problems and spectral theory); linear evolution equations of parabolic and hyperbolic types (including initial and boundary value problems). As time permits, additional topics might be included.

Course Prerequisites

Math611 and Math607 or Math641, or approval of instructor.

Course Learning Outcomes

Students will be able to: compute Fourier transforms of L^2 functions, and use Fourier transforms to solve PDE; work comfortably with functions in Holder and Sobolev spaces, including facility with Sobolev embeddings; work comfortably with various aspects of functional analysis, including duality and the geometry of Hilbert spaces; develop weak formulations of linear elliptic PDE and prove existence, uniqueness and regularity for such solutions; understand and apply maximum principles; apply Hilbert space methods to eigenfunctions and eigenvalues.

Textbook and/or Resource Materials

The text is Partial Differential Equations by Lawrence C. Evans, 2nd edition, Graduate Texts in Mathematics, vol. 19, American Mathematical Society.

Additional resources will be provided throughout the semester as needed.

Grading Policy

There will be three exams, more or less equally spaced through the semester, each worth 100 points. These exams will be *take home*. This is a graduate course; the grading scale reflects that: 80-100% = A, 60-79% = B, <60% = C.

Late Work Policy

I will accept homework that is up to one week late.

Course Schedule

Fourier transform, Sobolev spaces, approximation, extensions, traces, Sobolev inequalities, compactness, weak solutions for elliptic equations, regularity of weak solutions, maximum principles, eigenvalues and eigenfunctions, second order parabolic equations
These topics correspond to section 4.3.1, chapters 5 and 6 in Evans.

Covid 19 Items

Students attending face-to-face: YOU MUST WEAR A FACE MASK. Failure to do so will result in your being asked to leave the classroom and possibly in disciplinary action by the university (see applicable university rule(s) here: <https://rules-saps.tamu.edu/PDFs/34.99.99.M0.03.pdf>). YOU MUST NOT ATTEND CLASS FACE-TO-FACE IF YOU HAVE BEEN TESTED POSITIVE OR IF YOU HAVE SYMPTOMS; attend remotely instead, as able (see the Covid-19 Temporary Amendment below).

Students attending remotely: You will connect to the class via Zoom, with at least a speaker and a microphone (camera not required). You can access Zoom from Howdy (recommended, as this will have your information/profile). Meeting information (i.e. link to access) will be emailed to you.

Academic Integrity Statement and Policy

“An Aggie does not lie, cheat or steal, or tolerate those who do.”

“Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one’s work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case” ([Section 20.1.2.3, Student Rule 20](#)).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see [University Rule 08.01.01.M1](#)):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or

paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with [Counseling and Psychological Services](#) (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's [Title IX webpage](#).

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.

COVID-19 Temporary Addendum to Minimum Syllabus Requirements

The Faculty Senate temporarily added the following statements to the minimum syllabus requirements in Spring 2021 as part of the university's COVID-19 response.

Campus Safety Measures

To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, Texas A&M University has adopted policies and practices for the Spring 2021 academic term to limit virus transmission. Students must observe the following practices while participating in face-to-face courses and course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.):

- Self-monitoring—Students should follow CDC recommendations for self-monitoring. **Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely if that option is available, and should not participate in face-to-face instruction.**
 - Face Coverings—[Face coverings](#) (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is
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difficult to reliably maintain. Description of face coverings and additional guidance are provided in the [Face Covering policy](#) and [Frequently Asked Questions \(FAQ\)](#) available on the [Provost website](#).

- Physical Distancing—Physical distancing must be maintained between students, instructors, and others in course and course-related activities.
- Classroom Ingress/Egress—Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Leave classrooms promptly after course activities have concluded. Do not congregate in hallways and maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
- To attend a face-to-face class, students must properly wear an approved face covering. If a student refuses to wear a face covering, the instructor should ask the student to leave and join the class remotely. If the student does not leave the class, the faculty member should report that student to the [Student Conduct office](#) for sanctions. Additionally, the faculty member may choose to teach that day's class remotely for all students, or dismiss the class in the case of a traditional face to face lecture.

Personal Illness and Quarantine

Students required to quarantine must participate in courses and course-related activities remotely, if that option is available, and **must not attend face-to-face course activities**. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.

Students experiencing personal injury or illness that is too severe for the student to attend class qualify for an excused absence (See [Student Rule 7, Section 7.2.2.](#)) To receive an excused absence, students must comply with the documentation and notification guidelines outlined in Student Rule 7.
