

### Course Information

Course Number: Math611

Course Title: Introduction to ordinary and partial differential equations

Section: 600

Time: MW 5:35-6:50pm

Location: BLOC 113

Credit Hours: 3

### Instructor Details

Instructor: Emil Straube

Office: BLOC 601M

Phone:

E-Mail: [straube@math.tamu.edu](mailto:straube@math.tamu.edu)

Office Hours: Th 2:00-4:00 or by appointment; all office hours will be online via Zoom until further notice

### Course Description

Basic theory of ordinary differential equations; existence and uniqueness, dependence on parameters, phase portraits, vector fields. Partial differential equations of first order, method of characteristics. Basic linear partial differential equations: Laplace equation, heat (diffusion) equation, wave equation and transport equation. Solution techniques and qualitative properties.

### Course Prerequisites

Math410 or equivalent or instructor's approval.

### Course Learning Outcomes

Students will be able to: find exact solutions to linear ODE systems with constant coefficients; identify conditions under which nonlinear ODE systems have unique solutions that depend continuously on parameters and initial data; identify and classify PDE as linear, semilinear, quasilinear, or nonlinear; identify linear PDE as elliptic, hyperbolic, or parabolic; find exact solutions to special cases of Laplace's equation and understand qualitative properties of solutions to Laplace's equation as characterized by the Maximum Principle, Liouville's Theorem, and Harnack's inequality; find exact solutions to special cases of the heat equation and understand qualitative properties of solutions to the heat equation as characterized by the

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parabolic mean value formula and Maximum Principle; find exact solutions to special cases of the wave equation and understand qualitative properties of solutions to the wave equation; solve first order quasilinear and nonlinear equations with the method of characteristics.

### Textbook and/or Resource Materials

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

Evans' text does not cover the ordinary differential equations part of the course. For this part, I will use a portion of chapter 1 from Michael Taylor's book Partial Differential Equations, Basic Theory, namely sections 1, 2, 4, 6 and 7. This book is not a required text, but it is available for free download at <https://link.springer.com/book/10.1007%2F978-1-4419-7055-8>; I suggest that you download these sections.

### 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

ODEs: existence and uniqueness of solutions, exponentiation of matrices, dependence of solutions on initial conditions and parameters, vector fields and flows.

PDEs: introduction transport equation, Laplace's equation, the heat equation, wave equation, mean value formulas, properties of solutions, energy methods. (Chapters 1 and 2 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).

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*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](http://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](http://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.
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- 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](https://suicidepreventionlifeline.org).

### COVID-19 Temporary Amendment to Minimum Syllabus Requirements

The Faculty Senate temporarily added the following statements to the minimum syllabus requirements in Fall 2020 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 Fall 2020 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 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 difficult to reliably maintain. Description of
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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 wear a face covering (or a face shield if they have an exemption letter). 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.

### *Personal Illness and Quarantine*

Students required to quarantine must participate in courses and course-related activities remotely 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. While Student Rule 7, Section 7.3.2.1, indicates a medical confirmation note from the student's medical provider is preferred, **for Fall 2020 only, students may use the Explanatory Statement for Absence from Class form in lieu of a medical confirmation. Students must submit the Explanatory Statement for Absence from Class within two business days after the last date of absence.**

### *Operational Details for Fall 2020 Courses*

For additional information, please review the [FAQ](#) on Fall 2020 courses at Texas A&M University.

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