

Math 427J

Differential Equations with Linear Algebra

Fall 2025

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COURSE DESCRIPTION

This course covers a variety of topics in the theory of differential equations. Many of these topics are studied using concepts of linear algebra. In particular, we will use matrices and vectors to understand differential equations. The main objective is to provide students with practical mathematical skills necessary for advanced studies in science and engineering. Emphasis will be placed on concepts and computations rather than proofs. The prerequisite is one of M408D, M408L, M408S, or the equivalent, with a grade of at least C-. It is beneficial to attend every lecture and take careful notes. Some lecture material does not appear in the textbook.

LEARNING OBJECTIVES

(1) Students will develop effective thinking and communication skills. (2) Students will acquire mathematical independence and experience mathematical inquiry. (3) Students will develop problem-solving skills using tools and concepts from core mathematical areas, including Linear Algebra and Differential Equations. (4) Students will be exposed to the uses and power of mathematics. (5) Students will apply appropriate mathematical strategies to solve a given problem and assess the reasonableness of the results. (6) Students will effectively express and communicate the results of problem-solving using appropriate mathematical language and symbolism.

IN-PERSON AND ONLINE INSTRUCTION

Attendance of lectures is optional but highly encouraged. The instructor will open a Zoom session during the lecture and record the class. In addition, the instructor plans to use OneNote so that all class notes will be available in PDF. Refrain from relying solely on the recorded class because technology might fail. If technology fails, and it is impossible to solve the problem within 10 minutes of the class start; the lecturer will teach using traditional methods. On some occasions, we will conduct the class purely online. If that is the case, the instructor will make an announcement beforehand. Please make it a habit to check your email regularly for any updates or changes to upcoming class sessions or office hours.

WEBPAGE

In addition to Canvas, we will use the following website:

<http://www.ma.utexas.edu/users/lomeli/m427j>

Please check Canvas and this site regularly and use them to find the assignments, homework solutions, and extra material. Grades will appear in Canvas, as well as all the recordings of the Zoom classes. In addition, **class notes** of most lessons will also be available in Canvas, under `Files -> classnotes`.

OFFICE HOURS

MW 11:00 am-11:50 am, F 1:00 pm-1:40 pm, Th 10:00 am-11:00 am, or by appointment. Office hours on Thursday will be conducted via Zoom. Times and days for office hours might change during the semester.

TEXTBOOK

Differential Equations and Their Applications, 4th. Ed., by Martin Braun. The course will cover approximately the bulk of chapters 1, 2, 3, and 5, and other selected materials.

HOMEWORK

Understanding all the homework is crucial for your success in this course. Completing the problems will help you grasp the concepts behind them. We will give you weekly assignments, but we will not collect them. However, you will be responsible for knowing the material in the homework and applying this knowledge during midterm exams and quizzes. For help, you are encouraged to attend your recitation section, ask questions during the lecture, take advantage of office hours, and work in study groups. The textbook contains most of the answers for odd-number problems, and the instructor will provide solutions to many of the even-number problems. You should start the homework early.

QUIZZES

We plan to have **ten quizzes** during the semester, usually on **Thursday**. The quizzes purpose is to help students get a better idea of how well they understand the material. Students need to identify what they know and what they don't know. In this way, quizzes can help students use their time more effectively by focusing on the information they need to review and the skills they still need to practice. All the quizzes will be in-person during recitation. A calendar of the quizzes will be given later.

*To prepare for a quiz, use the exercises in the homework.
Solving homework number n will prepare you for quiz number n .*

MIDTERM EXAMS AND FINAL

There will be three midterm exams, and a comprehensive final.

- The three **midterm exams** will be given on the following dates: Thursday, 9/25; Tuesday, 10/21; and Thursday, 12/4. Each midterm will have an online part with some questions published on Gradescope. Details and instructions will be given later.
- In general, there will be **no make-up exams**. However, in some health-related emergencies, a make-up exam might be possible. If you are injured or sick during the scheduled midterm exam, please bring a note from your doctor or a letter from your primary care provider verifying your illness. If confidentiality is an issue, you can inform the Student Emergency Services, and they will communicate with the lecturer. The lecturer is understanding of absences due to illness or injury, but the degree to which he can be flexible is entirely at his discretion. Club sports competitions, job interviews, professional fairs, family events, personal travel, music festivals are unacceptable reasons to miss an exam. Please take note of the midterm dates and **plan accordingly**. A make-up exam will test the same material as the original, but the questions will be different.
- There will be a cumulative **final exam**. We plan to use the default final exam times that can be found on the following page: <https://registrar.utexas.edu/schedules/259/finals>
- Study **guides** for the midterms and the final will be provided. Start studying early.
- Please bring your UT ID card to each exam.
- Midterm exams will be returned in class. If you were not present on the day when these exams were returned, you can come to office hours to get them.

REGRADES

You have the right to request a **regrade** of a question. However, the regrade procedure is only intended to correct severe errors in grading. It is not intended as an opportunity to argue about each judgment call made by the graders. If you feel that a regrade is justified, type a respectful request on a piece of paper. Return your exam and the request to your instructor or TA for correction. If the exam was conducted online, please use the regrade option in Gradescope. If your request has some merit, we will change your grade. If there was an arithmetic error in adding points in any of your exams, let us know immediately, and we will record the correct grade. Altering an exam before submitting a regrade request violates the University of Texas Honor Code regarding academic integrity and may lead to academic disciplinary action.

GRADE DETERMINATION

Each student can get a maximum of 600 points. The grade will be determined from this number.

- Each midterm exam is worth 120 points. Midterms are 60% of the grade.
- Quizzes count for a total of 90 points, or 15% of your grade.
- The final is worth 150 points. This is 25% of the grade.
- The sum of these grades will determine your course letter grade as follows:

Points	564	540	522	504	480	462	444	420	402	384	360	<360
%	94%	90%	87%	84%	80%	77%	74%	70%	67%	64%	60%	<60%
Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

- Depending on the results of each exam, grades might be adjusted with a method announced later.
- Class attendance will not be used to determine your grade.
- The lowest **two** quiz scores will be dropped at the end of the semester, and the rest will be used to determine your quiz grade. This policy is implemented to avoid the need for make-up quizzes. We recognize that unexpected circumstances can arise, leading to missed quizzes. The policy aims to provide flexibility and alleviate the burden on students and instructors when unforeseen situations occur. Our purpose is to provide students with the necessary flexibility while avoiding the need for make-up exams. This approach acknowledges that unexpected events can impact students' ability to complete exams as scheduled and aims to support their academic progress without compromising the integrity of the evaluation process. Midterm exam scores will not be dropped.

FOURTH CLASS DAY

Thursday, 8/28 is the last day of the official add/drop period; after this date, changes in registration may require the approval of the department chair and the dean of students.

DROP POLICY AND DEADLINES

Wednesday, 9/10 (the twelfth class day) is the date on which the official enrollment count is taken. It is also the last day to drop a class for a possible refund.

If you want to drop after the twelfth class day, you must execute a Q-drop on or before Wednesday, 11/19, the Q-drop deadline. Wednesday, 11/19 is also the last day an undergraduate may withdraw or change a class to pass/fail. In addition, Monday, 12/8 is the last day an undergraduate may, with the required approvals, request a non-academic Q-drop. Under Texas law, you are only allowed six Q-drops while in college at any public Texas institution. For more information, see:

<https://undergradcollege.utexas.edu>

ACADEMIC INTEGRITY

Each student is expected to abide by the University of Texas Honor Code:

“As a student of The University of Texas at Austin, I shall abide by the core values of the University and uphold academic integrity.”

You are responsible for understanding UT’s Code of Conduct and the University Honor Code, which can be found at the following web address:

<http://deanofstudents.utexas.edu/conduct/standardsconduct.php>

DEAN OF STUDENTS AND STUDENT EMERGENCY SERVICES

The Dean of Students office is committed to helping all students at the University of Texas at Austin reach their fullest potential. If there are circumstances that are making it impossible for you to be successful, you should consider contacting the Dean of Students:

<https://deanofstudents.utexas.edu/>

✉ studentemergency@austin.utexas.edu

If you have any questions, please get in touch with the Deans office at (512) 471-5017.

SERVICES FOR STUDENTS WITH DISABILITIES

This class respects and welcomes students of all backgrounds, identities, and abilities. If there are circumstances that make the learning environment and activities difficult, or if you have medical information that you need to share or need specific arrangements, please let the instructor know.

The University of Texas is committed to creating an effective learning environment for all students, but this can only happen if you discuss your needs with the instructor as early as possible. The confidentiality of these discussions will be maintained. The University of Texas provides, upon request, appropriate academic accommodations for qualified students with disabilities. If that is the case, contact the Office of Disability and Access: (512) 471-6259. For more information:

<https://disability.utexas.edu>

<https://disability.utexas.edu/how-to-register/>

✉ access@austin.utexas.edu

SPECIAL TESTING ACCOMMODATIONS

If you are a student registered with the Disability and Access office, you can have special testing accommodations. In that case, you must present a letter from the Disability and Access office and discuss the exam dates and times with the instructor. If you plan to take an exam in the Campus Testing Center (CTC), reserve seats 72 hours before the exam and register through RegisterBlast. You will find a RegisterBlast link in Canvas.

Once the exam registration is complete, students will be directed to a confirmation page. They will also receive an email with exam information, the CTC Acknowledgement agreement, CTC testing procedures, and the location of the exam. In addition, CTC will send an email reminder one day before their scheduled exam date. Please schedule exams in the CTC well in advance; seats are limited.

For more information, contact the Campus Testing Center:

<https://testingservices.utexas.edu/campus-testing-center>

✉ campustesting@austin.utexas.edu

“KEEP LEARNING” RESOURCES

This course may be offered in a format you are unfamiliar with. If you are looking for ideas and strategies to help you feel more comfortable participating in our class, please explore the resources available here: <https://onestop.utexas.edu/keep-learning/>

TITLE IX REPORTING

Title IX is a federal law that protects against sex and gender-based discrimination, sexual harassment, sexual assault, sexual misconduct, dating/domestic violence, and stalking at federally funded educational institutions. UT Austin is committed to fostering a learning and working environment free from discrimination in all its forms. When sexual misconduct occurs in our community, the university can:

- Intervene to prevent harmful behavior from continuing or escalating.
- Provide support and remedies to students and employees who have experienced harm or have become involved in a Title IX investigation.
- Investigate and discipline violations of the university’s relevant policies.

For more information, please check: <https://titleix.utexas.edu/policies>

MENTAL HEALTH

The University of Texas has the following center if you need support:
Counseling and Mental Health Center, Student Services Bldg (USB), 5th Floor.
Their numbers are (512) 471-3515 (appointments), (512) 471-2255 (24/7 crisis line).
For more information, see: <http://cmhc.utexas.edu/>

SHARING OF COURSE MATERIALS IS PROHIBITED

No materials used in this class, including, but not limited to, lecture hand-outs, videos, assessments (quizzes, exams, papers, projects, homework assignments), in-class materials, review sheets, class notes, and additional problem sets, may be shared online or with anyone outside of the class unless you have explicit, written permission from the lecturer. Class recordings are reserved only for students in this class for educational purposes and are protected under FERPA (<https://studentprivacy.ed.gov/>.) Please do not share any of the recordings outside the class in any form. The unauthorized sharing of materials promotes cheating, violates the University’s Student Honor Code, and is an act of academic dishonesty. Any materials found online associated with you or any suspected unauthorized sharing of materials will be reported to Student Conduct and Academic Integrity in the Office of the Dean of Students. This can result in sanctions, including failure in the course or academic probation.

STATEMENT ON LEARNING SUCCESS

Your success in this class is important. If aspects of this course prevent you from learning or exclude you, please seek help as soon as possible. Together, we can develop strategies to meet your needs and the requirements of the course. It is encouraged to use all the student resources available through the university. Check: <https://undergradcollege.utexas.edu/student-success>

ACCOMMODATIONS FOR RELIGIOUS HOLIDAYS

By the University of Texas policy, you must notify the instructor of your pending absence at least fourteen days before the date of observance of a religious holy day. (For religious holidays that fall within the first two weeks of the semester, the notice should be given on the first day of the semester.) If you must miss a class, an examination, a work assignment, or a project to observe a religious holy day, you will be allowed to complete the missed work within a reasonable time after the absence.

MAKE-UP POLICY FOR STUDENT-ATHLETES

As an institution that supports NCAA sports, we recognize the commitment and dedication required of student-athletes. In consideration of their rigorous training schedules and competitive obligations, student-athletes participating in NCAA sports are eligible for make-up opportunities for missed exams. It is important to note that this make-up privilege exclusively applies to student-athletes participating in NCAA-sanctioned sports. Proper documentation, such as a coach's or athletic department's verification, may be required to avail of these make-up options. The student-athlete is responsible for communicating and coordinating with the instructor regarding missed coursework in a timely manner. All make-up arrangements must be made within a reasonable timeframe, as determined by the instructor, to ensure fair and consistent academic opportunities for all students. Please note that students participating in recreational sports are not eligible for make-up privileges. Additionally, the final exam date and time are non-negotiable and cannot be changed for any reason. All students, including student-athletes, must plan their academic and athletic commitments accordingly.

COMMUNICATION, ANNOUNCEMENTS AND EMAIL

Throughout the semester, the instructor will send you emails with announcements to remind you about exams or answer questions. For this, we will use the email that is part of Canvas. However, if you want to communicate with the instructor, it is better to use the email address `lomeli@math.utexas.edu`

When you email the instructor, be polite and introduce yourself. Write that you are part of M427J and mention your section. If there are issues that you want to discuss in person, please make an appointment as soon as possible. Don't wait until the end of the semester to try to solve something that concerns you from the beginning. If you have an issue with the TA, please tell the lecturer. The instructor is on your side and cares about your success.

FALL 2025 DISCLAIMER

All items in this syllabus are subject to change. Changes will be announced in class and on Canvas.