

MATH 2280 - INTRODUCTION TO DIFFERENTIAL EQUATIONS

Spring 2022

Instructor: Chang(Kamala) Liu	Time: MoTuWeFr/12:55-1:45PM
Email: liukamala@math.utah.edu	Place: WBB 207

Office Hours: TuFr/2:30-3:30PM (tentative)

The first office hour is scheduled on Friday, Jan 14. If you need to see me outside of these times, we can set up an appointment. (In-person office hours are available by appointment.)

You can join the [Zoom Meeting](#) via the Zoom tab in Canvas, or:

<https://utah.zoom.us/j/95471732019> Meeting ID: 95471732019 Passcode: 432547

Main References:

Differential Equations and Boundary Value Problems, Computing and Modeling, 5th Edition. By C. Henry Edwards and David E. Penney. **ISBN 13: 9780321796981.**

You can access the Ebook via the Bookshelf tab in Canvas. (You can also read the text using the Bookshelf app.)

Overview and Objectives: MATH 2280 is an introduction to differential equations, and how they are used to model problems arising in science and engineering. It is the second semester of the year long sequence MATH 2270-2280, which is an in-depth introduction to *linear* mathematics. The material is heavily based on your understanding of *linear algebra*. You would also need a basic understanding of multivariable Calculus, vector spaces as well as complex variables.

- This course is mainly on *ordinary* differential equations (**ODEs**), with a basic introduction to partial differential equations (PDEs) in the final part.
- This course is mostly focused on *analytic* solutions to differential equations, with a scattered introduction to *numerical* solutions.
- This course has a significant amount of emphasis on modeling and applications. In particular, we will learn to derive the differential equations *modeling* various dynamic systems arising in science and engineering.
- The first part of the course is on scalar ODEs of first and second (or higher) order.
- The second part of the course, which is the core, is on *linear constant coefficient* systems of ODEs. This is an important application of *linear algebra*.
- In addition, we will learn to qualitatively analyze and approximate solutions to *nonlinear* (systems of) ODEs using geometric methods, and linearization.
- In the final part of the course, we will gain an introductory understanding of Laplace transform methods and Fourier series methods of solving differential equations.

Prerequisites: "C" or better in MATH 2270 - Linear Algebra.

Letter Grade Distribution:

95-100	A	90-94	A-	85-89	B+
80-84	B	75-79	B-	70-74	C+
65-69	C	60-64	C-	55-59	D+
50-54	D	45-49	D-	0-44	E

Grade Distribution:

Weekly Homework	20%
Weekly Quizzes	10%
Midterm Exam 1	20%
Midterm Exam 2	20%
Final Exam	30%

Important Dates:

Exams:

Midterm Exam 1	Friday, February 18
Midterm Exam 2	Friday, April 1
Final Exam	Friday, April 29

Official Drop/Withdraw Dates: The last day to *drop* classes is **Friday, January 21**; the last day to *withdraw* from classes is **Friday, March 4**. Please check the **academic calendar** for more information pertaining to dropping and withdrawing from a course. Withdrawing from a course and other matters of registration are the student’s responsibility.

Holidays: There will be no class on Monday, **January 17** (Martin Luther King Jr. Day), Monday, **February 21** (Presidents Day), and **March 7-11** (Spring Break).

Course Policies:

• Homework:

- There will be regular homework assignments, due *weekly*. Most of the problems will be taken from the **textbook**.
- Your solutions to a homework assignment should be submitted as a file upload to Canvas or Gradescope (*to be determined by our grader*) through the proper assignment listing. Please keep in mind the course grader is not required to award points on homework that is illegible due to poor formatting, poor handwriting, ruined paper, poor quality of uploaded file, etcetera. If you submit a photo of your assignment (rather than a scan or digital file), it must be legible, in good lighting, taken from directly above, and not blurry.
- Homework will be graded partially on completion, and partially on correctness. A random portion of each assignment will be graded for correctness. You need to show sufficient work on every assigned problem to gain full credit.
- The homework will be due on Mondays at noon (tentative). (The first homework will be due on Jan 24.)
- There will be a total of 10 homework assignments. The *two lowest* homework grades will be dropped from your total grade; thus, **late homework will not be accepted**.
- While students are encouraged to work together and discuss homework problems, your solutions are expected to be your own; your work and explanations of it should be unique and each student must submit their own file. Any *referenced* work must be clearly documented, cited,

and attributed, regardless of media or distribution. Even in the case of work licensed as public domain or Copyleft, (See: <http://creativecommons.org/>) you must provide attribution of that work in order to uphold the standards of intent and authorship. Please note that plagiarism will not be tolerated and will be dealt with in accordance to university policy.

- Quizzes:

- Quizzes will be given weekly *during class*, at the *end* of the class time each Friday (tentative). (The first quiz will be given on Jan 21.)
- The quizzes will be short with 1 to 2 problems, taking from 15 to 25 min. The quiz will cover relevant topics up to the lecture before (Wednesday lectures).
- The quizzes are *open-notes*, and you are also allowed to talk to other students (within safety) during the time. But you must write done and submit your own solutions.
- There will be a total of 10 quizzes. The *lowest two* quiz grades will be dropped from your total grade; thus, **no** *makeup quizzes will be given*.
- Feedback of quizzes will be given in Gradescope.

- Exams:

- There will be two 50-min **midterm exams**, held during the regular class time. The first midterm exam will be on Friday, Feb 18 (tentative), roughly covering the first part of the course material. The second midterm exam will be on Friday, Apr 1 (tentative), roughly covering the second part of the course material.
- The two-hour comprehensive **final exam** is scheduled for Friday, Apr 29, 1-3 PM in our regular classroom. (This is the time and location scheduled by the University and cannot be changed.)
- The exams are *closed-book*. You are **not** permitted to work with other students on exams. To do so will put you in violation of the University of Utah's academic conduct policies.
- There will be no makeup exams unless there are serious extenuating circumstances.
- Feedback of exams will be given in Gradescope.

- Late and Missed Assignments: You are expected to turn things in on time and take exams at the times given unless there are serious extenuating circumstances. Several course policies are designed to provide you flexibility by *dropping* assignments. If you miss the number of dropped assignments or fewer, no makeup assignments will be given. *If you miss more than the number of dropped assignments for compelling reasons*, you should contact me in a timely manner to discuss options. If the situation is one that can be documented, you may be asked to provide documentation. If you know about the situation in advance (such as officially sanctioned university activities), contact me at least *one week in advance* of any such obligations to arrange accommodation.

- Grades:

- Grades will NOT be rounded or curved.
- Grades will be listed on the **Canvas** page. Students are required to track their progress throughout the semester and voice any concerns or questions with me through the appropriate channels of communication. While the Canvas listing can be a fairly accurate representation of your grade, the final grades may vary slightly, especially if you missed any assignments.

- Contacting Me:

- My math department email address (liukamala@math.utah.edu) is the best way to reach me. During workdays, I will try to respond within 24 hours. **Concerning e-mails sent on weekends, do not expect a reply until Monday.**

- **Please do NOT e-mail me through the Canvas message system.** I cannot guarantee that I will respond to e-mails sent through Canvas or to other addresses that are not my math department address.
- Technology Requirements:
 - Students are expected to be able to navigate in **Canvas** and **Gradescope**, in particular submitting assignments and viewing feedback.
 - Students are expected to **regularly check notifications on Canvas**, including notices and instructions on assignments and exams.
 - Although numerical methods are not a main focus of this course, you are expected to have (or be able to gain) *a basic mastery of Matlab or Maple*. Your skills in such softwares, however, will not be a major part of your evaluation.
 - In the event that our class needs to be moved *online* temporarily for health or safety reasons, students should have access to the necessary equipment.
- Note that this syllabus is **subject to change throughout the semester** as I see fit, with or without notice. By not withdrawing or transferring from this class, you hereby agree to the class policies and procedures outlined above.

COVID-19 Campus Guidelines:

University leadership has urged all faculty, students, and staff to model the vaccination, testing, and masking behaviors we want to see in our campus community. These include:

- Vaccination
- Masking indoors
- If unvaccinated, getting weekly asymptomatic coronavirus testing
- Quarantining after exposure

Vaccination:

- Get a COVID-19 vaccination and the booster shot recommended for pairing with your vaccine if you have not already done so. Vaccination is proving highly effective in preventing severe COVID-19 symptoms, hospitalization and death from coronavirus. Vaccination is the single best way to stop this COVID resurgence in its tracks.
- University of Utah students are required (as of August 27, 2021) to complete a cycle of COVID-19 vaccination and booster shot with an approved vaccine, or complete an exemption form. The university provides three convenient vaccination options:
 - Attend one of the regularly scheduled **vaccine events** at the Student Union on campus.
 - Schedule an appointment with Student Health **here**.
 - Visit <http://mychart.med.utah.edu/>, <http://alert.utah.edu/covid/vaccine>, or <http://vaccines.gov/> to schedule your vaccination.

Masking:

- While masks are not required outside of Health Sciences facilities, on UTA buses and campus shuttles, CDC guidelines now call for everyone to wear face masks indoors.
 - Check the CDC website periodically for masking updates <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated-guidance.html>
 - With high transmission rates in Salt Lake County, the CDC recommends:
“Everyone should wear a mask in public indoor settings.”
 - Treat masks like seasonal clothing (i.e. during community surges in COVID transmission, they should be worn indoors and in close groups outside).
 - In cases of classroom exposure, masks should be worn for the quarantine period (see details below).

Testing:

- If you are not yet vaccinated, get weekly asymptomatic coronavirus tests. This is a helpful way to protect yourself and those around you because asymptomatic individuals can unknowingly spread the coronavirus to others.
 - Asymptomatic testing centers are open and convenient:
 - * Online scheduling: visit alert.utah.edu/covid/testing
 - * Saliva test (no nasal swabs)
 - * Free to all students returning to campus (required for students in University housing)
 - * Results often within 24 hours
- Students must self-report if they test positive for COVID-19 via: <https://coronavirus.utah.edu/>.

ADA Statement: The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability & Access (CDA), 162 Olpin Union Building, 801-581-5020 (V/TDD), <https://disability.utah.edu/>. The CDA will work with you and me to make arrangements for accommodations. All information in this course can be made available in alternative format with prior notification to CDA. If you need accommodations, it is your responsibility to give me the paperwork and take initiative in telling me what you need. We can work something out; however, I will not know what you need, if you do not tell me.

Safety Statement: The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu.

Academic Honesty: Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Basically, don't cheat. For questions about what constitutes academic misconduct, see University of Utah Policy 6-400, or ask me.

Addressing Sexual Misconduct: Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted on the basis of your sex, office for equal opportunity and affirmative action including sexual orientation or gender identity/expression, you are encouraged to report it to the University's Title IX Coordinator; Director, Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, <https://oeo.utah.edu/contact-us/index.php> or to the Office of the Dean of Students, 270 Union Building, 801-581-7066, <https://deanofstudents.utah.edu/>. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to police, contact the Department of Public Safety, 801-585-2677(COPS), <https://police.utah.edu/>.

University Counseling Center: The UCC staff is committed to supporting the mental health needs of our campus community. Their phone number is 801-581-6826. Their hours are Monday-Friday, 8:00am-5:00pm. For after-hours emergencies, contact the 24/7 Crisis Line: 801-587-3000. More information is at <https://counselingcenter.utah.edu/>.

Office of the Dean of Students: The Office of the Dean of Students is dedicated to being a resource to students through support, advocacy, involvement, and accountability. It serves as a support for students facing challenges to their success as students, and assists with the interpretation of University policy and regulations. To contact the Office of the Dean of Students, please email deanofstudents@utah.edu or call 801-581-7066. There is more information at <https://deanofstudents.utah.edu/>.