

## MATH 2280.001: INTRODUCTION TO DIFFERENTIAL EQUATIONS FALL 2021

**Lectures:** MoTuWeFr, 8:35AM – 9:25AM, at WEB 2230.

**Instructor:** Farhan Abedin *E-mail:* u6037075@utah.edu

**Office hours:** TuThu, 10:00 AM – 11:00 AM, on Zoom (see Canvas for links)

**Textbook:** *Differential Equations and Boundary Value Problems, Computing and Modeling, 5th edition*, by Edwards and Penney (available on Canvas, under Bookshelf).

**Prerequisites:** Linear Algebra (MATH 2270) and its prerequisite courses.

**Course overview:** Math 2280 is an introduction to ordinary differential equations, and how they are used to model problems arising in engineering and science. It is the second semester of the year long sequence 2270–2280, which is an in-depth introduction to linear mathematics. Along with Calculus, the linear algebra that you learned in Math 2270 will provide a considerable amount of the conceptual and computational framework for our discussions in Math 2280. This will become more apparent as the course progresses.

**Assessment and Grading:** Your total grade will be distributed/weighted as follows:

- *Homework (20 percent):* Weekly assignments will become available on Wednesday and will be due Friday of the following week (except during midterm weeks) at 8:30 AM. A portion of each assignment will consist of WebWork problems that can be accessed through the Canvas page for our course and must be completed online. The remainder of the assignment will consist of written response problems which will also be posted on Canvas. Your responses should be uploaded to Canvas as a single PDF file. Submissions can be handwritten or typeset (using LaTeX), but must be legible. Your lowest two homework scores will be dropped.
- *Quizzes (10 percent):* At the end of each Wednesday's lecture (except during midterm weeks), a short 1-2 problem quiz will be given, taking roughly 15 minutes to do. The quiz will cover relevant topics from the week's lectures and homework. Your lowest two quiz scores will be dropped. There are no makeup quizzes.
- *Midterms (40 percent):* Two in-class midterm exams will take place on **Friday, October 1** and **Friday, November 19**. In-class reviews will take place the Wednesday before each exam. No midterm scores will be dropped. Makeups will be scheduled only if there are exigent circumstances.
- *Final Exam (30 percent):* A two-hour comprehensive final exam is scheduled for **Friday, December 17, 8:00 – 10:00 AM** at WEB 2230 (where our class usually meets). This is the time and location scheduled by the University and cannot be changed, so please mark your calendars ahead of time.

I will use the following grade scale created by the University.

Letter	Scoring
A	100% - 94%
A-	93.9% - 90%
B+	89.9% - 87%
B	86.9% - 84%
B-	83.9% - 80%
C+	79.9% - 77%
C	76.9% - 74%
C-	73.9% - 70%
D+	69.9% - 67%
D	66.9% - 64%
D-	63.9% - 60%
E	59.9% - 0%

**Course objectives:**

- Model various dynamical systems arising in math, science, and engineering.
- Learn solution techniques for solving first order separable and linear differential equations.
- Understand how to approximate solutions via slope fields and phase diagram analysis.
- Apply vector space concepts from linear algebra to understand the solution space to linear systems of differential equations.
- Solve constant coefficient linear differential equations via superposition, particular solutions, and homogeneous solutions found via characteristic equation analysis.
- Use Laplace transform techniques to solve linear differential equations, with an emphasis on the initial value problems of mechanical systems, electrical circuits, and related problems.
- Apply matrix algebra concepts related to eigenvalues, eigenvectors and matrix diagonalization, in order to find the general solution space to first and second order constant coefficient homogeneous linear systems of differential equations.
- Work with matrix exponentials and other fundamental matrix solutions, as tools for understanding linear systems of differential equations with constant coefficients.
- Use linearization as a technique to understand the behavior of nonlinear dynamical systems near equilibrium solutions.
- Learn about Fourier series, and use them as an “infinite superposition” tool to study forced oscillation problems.
- Gain familiarity with the basic partial differential equations of math and physics.

**Important dates:** Please refer to the Registrar’s website.

**Tutoring:** The Math Tutoring Center is located in the Rushing Student Center, in the basement between LCB and JWB on President's Circle. You will be able to find tutors there who can help with Math 2280 homework. Please check the website for hours.

### **COVID-19 Guidelines:**

*Vaccination:* Get a COVID-19 vaccination 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. Visit <http://mychart.med.utah.edu/>, <http://alert.utah.edu/covid/vaccine/>, or <http://vaccines.gov/> to schedule your vaccination.

*Masking:* While masks are no longer required outside of Health Sciences facilities, UTA buses and campus shuttles, CDC guidelines now call for everyone to wear face masks indoors.

*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. Saliva based testing is available at [alert.utah.edu/covid/testing](http://alert.utah.edu/covid/testing).

*Self-Reporting:* All of us, including faculty, students, and staff, must self-report if we test positive for COVID-19 via this website: <https://coronavirus.utah.edu/>.

**Americans with Disabilities Act (ADA):** 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, 162 Olpin Union Building, 801-581-5020, <https://disability.utah.edu/>. CDA will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability & Access.

**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/>.

**Campus Safety:** 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 <https://safeu.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](mailto:deanofstudents@utah.edu) or call 801-581-7066. There is more information at <https://deanofstudents.utah.edu/>.