

MATH 1310-004 Engineering Calculus I, Fall 2021

Class Meetings: Lecture: MTWF at 10:45am-11:35am JTB 310

Lab Meetings:

Section 005: TH at 10:45am-11:35am LCB 225, Section 006: TH at 9:40am-10:30am JTB 320

Section 007: TH at 10:45am-11:35am JTB 110, Section 008: TH at 8:35am-9:25am JTB 120

Instructor: Kees McGahan

Email: mcgahan@math.utah.edu

Office Hours: TBA

Lab Instructor: TBA

Lab Office Hours: TBA.

Text: *Calculus: Concepts and Contexts*, by James Stewart (4th edition)

An e-version of the textbook will automatically show up in Canvas provided that you opt in to the "inclusive access" program (which is the default case). The text is a \$40/semester rental that is added to the course fee.

Course Information: Math 1310 Calculus I is a 4 credit course.

Course Description: Differential and integral calculus with a focus on engineering applications and projects; functions and models; rates of change in science and engineering, limits and derivatives; related rates; derivatives and shapes of graphs; optimization; Newton's method; definite integrals, antidifferentiation and Fundamental Theorem of Calculus; techniques of integration; numerical and symbolic integration with software; arc length, area, and volumes via integration. This is a 4 credit hour course that satisfies a quantitative reasoning requirement.

REQUIRED TECHNOLOGY: A camera that can be used to upload high quality photo of your work.

Canvas: Canvas will be used for posting course announcements, gradescope, as well as homework assignments, grades, files and any relevant supplementary material. You can access the Canvas page through CIS or by logging in at utah.instructure.com. Students should check the Canvas page regularly for course information and resources. Email notifications and correspondence will be sent to the student's UMail address ([u-number]@utah.edu); this email account must be checked regularly.

Gradescope: Gradescope will be used to turn in homework as well as midterms and the final. Quizzes will also be assigned through canvas. If you believe an assignment has been misgraded you may submit and regrade request via gradescope within a week of the assignment being graded.

Grading: The following are the grade components and the percentage each contributes to a student's final grade:

- **Homework Assignments (15%)**- Roughly three textbook sections are due most Fridays by 11:59 pm via gradescope. The homework will typically cover material covered up to and including the preceding Monday. A select few of the problems will be selected for grading by the grader, each graded out of 5 points. There will also be 5 points given for completion. The lowest homework score will be dropped. Late homework is, in general, not accepted.
- **Labs (15%)**- Every Thursday a directed lab session will be held. These lab sections consist of working on lab worksheets in groups. The lab instructor will be there to help guide students through the problems. The worksheets need to be submitted to gradescope by the following Wednesday at 11:59PM. You will be expected to complete the worksheet outside of lab. The lowest lab score will be dropped.
- **Quizzes (10% total)**: Quizzes will be given to see where students are at with the material. The quizzes will be composed of 1-2 questions covering the material since the previous Friday's class. The quizzes should be available from Friday through Sunday, although they will be timed, so once you start

you must finish. The quizzes will be open book and note (and maybe group quizzes). The quizzes will be administered via canvas. They are multiple choice. Some number of quizzes will be dropped.

- **Midterm Exams (35%, 17.5% each)**- Two 50-minute midterm exams will be given on select Fridays. A practice exam will be posted a week prior to the midterm that will cover the same material. Dates of the midterm exams will be Friday October 1st and Friday November 12th. Exams can not be rescheduled or made-up. Midterms will be closed note and closed book.
- **Final Exam (25%)**- A two-hour comprehensive exam will be given. As with the midterms, a practice final will be posted a week prior. Our final exam is scheduled for Wednesday, December 15, 2021 10:30 am – 12:30 pm. The final can not be rescheduled. The final will be closed note and closed book.

Students with university excused absences (band, debate, student government, intercollegiate athletics) should make alternate arrangements with me as soon as possible if the absence interferes with any course components.

Final course letter grades will be determined as follows: If X is your course percentage weighted according to the above, then $\{X \geq 93\% \Rightarrow A, X \geq 90\% \Rightarrow A-, X \geq 87\% \Rightarrow B+, X \geq 83\% \Rightarrow B, X \geq 80\% \Rightarrow B-, X \geq 77\% \Rightarrow C+, X \geq 73\% \Rightarrow C, X \geq 70\% \Rightarrow C-, X \geq 67\% \Rightarrow D+, X \geq 63\% \Rightarrow D, X \geq 60\% \Rightarrow D-, X < 59\% \Rightarrow E\}$.

The instructor retains the right to modify this grading scheme during the course of the semester; students will, of course, be well notified of any adjustments.

Additional Resources

- **Tutoring Center & Computer Lab**- There is free tutoring in the T. Benny Rushing Mathematics Student Center (room 155, the lower level between JWB and LCB), as well as a computer lab. For more information see <http://www.math.utah.edu/undergrad/mathcenter.php>
- **Private Tutoring**- ASUU Tutoring Center, 330 SSB. There is also a list of tutors at the math department office JWB 233.

Calculators: Calculators will not be allowed on exams or quizzes. They may be used on homework, but you should still write out the details of your computation. It is in your best interest not to become too dependent on your calculator since they will not be allowed on exams.

Expected Learning Outcomes: Upon successful completion of this course, a student should be able to:

1. Understand the making of functions from elementary functions via translation, scaling, and function composition; learn how to graph the corresponding function and identify its inverse function.
2. Master the concept of limiting value of a function as the argument approaches certain value. Take limits of algebraic and trigonometric expressions of the form $0/0$ (that simplify), non- zero number over 0, including limits that go to (positive or negative) infinity, limits that do not exist and limits that are finite.
3. Understand the concept of derivative as the limit of the ratio of the function value difference to the argument difference as the latter approaches zero. Know what rules to use to differentiate products and quotients.
4. Use the limit definition of derivatives to obtain derivatives of polynomial, rational and some trigonometric functions; understand the concept of continuity.
5. Understand the concept of chain rule to differentiate functions composed of elementary functions and functions that are implicitly defined; perform implicit differentiation and compute higher order derivatives.

6. Use differentiation to find stationary, singular and inflection points, as well as domain and limit information to determine vertical and horizontal asymptotes, and then use all of that information to sketch the graph of a curve for $y = f(x)$.
7. Model situations involving two related quantities and know how to use one rate of change to infer the other that may be difficult to observe. Use the concept of differentials to obtain function approximations, and solve optimization problems that involve maximum and/or minimum values resulting from engineering applications.
8. Understand the concept of indefinite integral as the antiderivative and the definite integral as the limiting value of a large sum.
9. Compute indefinite and definite integrals, using the power rule and basic substitution and the Fundamental Theorems of Calculus.
10. Apply the definite integral to compute areas between two curves, volumes of solids of revolutions, arc length, surface area for surfaces of revolution and center of mass.

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

- 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.
- 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.
- 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
- 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/>.

Student Responsibilities: All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. Students have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, plagiarism, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to Faculty Rules and Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, and I will do so, beginning with verbal warnings and progressing to dismissal from and class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee. <http://regulations.utah.edu/academics/6-400.php>

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/>.

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, 162 Olpin Union Building, 801-581-5020. 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.

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/>.

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, veterans status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

Student Names and Personal Pronouns: Class rosters are provided to the instructor with the students legal name as well as Preferred first name (if previously entered by you in the Student Profile section of your CIS account). While CIS refers to this as merely a preference, I will honor you by referring to you with the name and pronoun that feels best for you in class, on papers, exams, group projects, etc. Please advise me of any name or pronoun changes (and update CIS) so I can help create a learning environment in which you, your name, and your pronoun will be respected. If you need assistance getting your preferred name on your UIDcard, please visit the LGBT Resource Center Room 409 in the Olpin Union Building, or email bpeacock@sa.utah.edu to schedule a time to drop by. The LGBT Resource Center hours are M-F 8am-5pm, and 8am-6pm on Tuesdays.

Wellness Statement: Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student's ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at www.wellness.utah.edu or 801-581-7776.

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.

Course Roadmap Week-by-Week: Below is an outline of the sections and topic covered in this course. Schedule subject to change

Week 1 Introduction, Functions: Chapters 1.3-1.6

Week 2 Functions and Limits: Chapters 1.7-2.2

Week 3 Limits: Chapters 2.3-2.5

Week 4 Derivative Concepts: Chapters 2.6-2.8

Week 5 Derivative Techniques: Chapters 3.1-3.3

Week 6 Derivative techniques: Chapters 3.3-3.5 Midterm 1

Week 7 Derivative techniques: Chapters 3.6-3.9

Week 8 Applications of Derivatives: Chapters 4.1-4.3

Week 9 Applications of derivatives: Chapters 4.4-4.6

Week 10 Applications of derivatives: Chapters 4.7-4.8, 5.1

Week 11 Integral concepts: Chapters 5.2-5.3 Midterm2

Week 12 Integration techniques: Chapters 5.4-5.6

Week 13 Integration techniques: Chapters 5.7,5.9

Week 14 Integration techniques and applications: Chapters 5.10, 6.1

Week 15 Applications of integration Chapters 6.2,6.3