MATH 1310: Engineering Calculus I
Section 004
Spring 2025

Last updated: February 3, 2025

Instructor:	Filip Belik	**Email:**	filip.belik@utah.edu
Time:	MTWF 10:45am – 11:35am	**Place:**	WEB 1250
Lab TA:	Ryno Chen	**Email:**	ryno.chen@utah.edu
Lab 1:	Th 10:45am in LCB 121	**Lab 2:**	Th 11:50am in LCB 219

Office Hours: Mondays at 1:30-3:00pm in the LCB Loft (4th floor) or by appointment.

Main References: The main text for this course is the 5th edition Stewart and Kokoska Calculus book. This course will follow the topics of the book closely and homework will be assigned from book problems.

- James Stewart and Steve Kokoska, *Calculus: Concepts and Contexts*, Cengage Learning, 5th ed., 2023.

Objectives: The goal of MATH 1310 is to master the basic tools for the study of functions $f(x) = y$, termed *the calculus*, and become skilled in its use for solving problems in science and engineering. These basic tools and problem solving skills are described below.

Tools and Skills:

- Students will understand how to transform functions into other functions through x and y translations and rescaling, re-parameterizations, and function composition. Students will also know the properties of special classes of functions including logarithms, exponential functions, polynomials, and rational functions; and know how to obtain function inverses $f^{-1}(y) = x$ when they exist.
- Students will master the concept of a limiting value of a function $f(x) = y$ when x approaches a value c, know when limits exists, utilize limit laws, how the property of continuity of a function at c relates to its limiting value, how asymptotic behavior can be described by limits, and how limiting values can be specified even when the $f(c)$ is not defined.
- Students will understand how to use limits to compute the derivative of a function f' that describe or rate of change of a function f. Students will be able to utilize derivatives to model how two related quantities change with respect to each other, including motion of objects by in terms of velocity and acceleration. Students will also learn the methods of differentiation for different classes of functions including exponential and logarithmic functions, trigonometric and inverse trigonometric functions, power functions, and compositions, sums, products, and quotients of functions, as well as differentiating functions that are only implicitly defined by an equation. Students will also be able to utilize the derivative in applied contexts, including function approximation, and how the average slope of a function relates to the derivative through the mean value theorem. If two quantities are related by an equation, students will be able to obtain the derivative of one quantity by knowing the derivative of the other. Students will know how to utilize linear approximations to perform numerical/algorithmic equation solving via Newton's method. Also, students will be able to utilize the derivative to find maximum, minimum, or otherwise "optimal" input values for equations important in science, business, and engineering.
- Students will understand the definition of the integral of a function as the limiting value of an increasingly large average of function values. They will be able to relate the integral to anti-differentiation, when appropriate, through the fundamental theorem of calculus. Students will also be able to relate the integral to the area under the function's curve, know how to approximate the integral by a finite sum, and how to integrate over infinite-length domains. Specific integration techniques will also be

mastered, including substitution, integration-by-parts, and partial fractions. Finally, students will understand the key concept underlying integration, that it computes the net accumulation of a quantity through summation of the change in the quantity amount per unit of time or space, over an specified interval of time or space.

Suggested Prerequisites: At least one of the following is suggested for taking MATH 1310.

- "C" or better in College Algebra and Trigonometry (MATH 1050 AND MATH 1060)
- "C" or better in Precalculus (MATH 1080)
- AP Calc or AB score of 3 or better
- Accuplacer CLM score of 95 or better
- ACT Math score of 28 or better
- SAT Math score of 630 or better
- Departmental consent

Tentative Course Outline:

- Week 1: 0-1.2 — Preview of calculus, algebra and precalculus review, functions
- Week 2: 1.3, 1.5, 1.6 — Function transformations and compositions, logarithms and inverse functions, parametric curves
- Week 3: 2.1-2.3 — Tangents and velocity, limits, limit laws
- Week 4: 2.3-2.5 — Limit laws, continuity, limits at infinity
- Week 5: 2.6-3.1 — Derivatives and rates of change, derivative as a function, derivatives of polynomials and exponential functions
- Week 6: 3.2, 3.3 — Product and quotient rules, trig functions, Midterm Exam 1
- Week 7: 3.4-3.6 — Chain rule, implicit differentiation, inverse trig functions
- Week 8: 3.7, 3.9, 4.1 — Log functions and their derivatives, linear approximation, related rates
- Week 9: 4.1-4.4 — Related rates, max and min values, derivatives and shapes of curves, graphing with calculus and technology
- Week 10: 4.5-4.7 — l'Hôpital's rule, optimization, Newton's method
- Week 11: 4.8, 5.1 — Antiderviatives, areas and distances, Midterm Exam 2
- Week 12: Appendix F, 5.2, 5.3 — Sigma notation, definite integrals
- Week 13: 5.4-5.6 — Fundamental theorem of calculus, substitution rule, integration by parts
- Week 14: 5.7, 5.9, 5.10 — Other integration techniques, approximate integration, improper integrals
- Week 15: Slack time and Review.
- Week 16: Finals week.

Important Dates:

- January 6: First day of classes
- January 10: Last day to add without a permission code
- January 10: Last day to wait list
- January 17: Last day to add, drop, and audit
- January 20: Martin Luther King Jr. Day (No class)
- February 14: Midterm 1
- February 17: President's Day (No class)
- February 28: Last day to withdraw from classes
- March 9-16: Spring break (No class)
- March 28: Midterm 2
- April 22: Classes end
- April 23: Reading day

- April 29, 10:30am - 12:30pm: **Final exam**

The dates of the midterms are subject to change depending on the status of the course.

Grading Policy: Your grade is determined as follows:

- Homeworks 15%
- Quizzes 10%
- Lab 15%
- Midterm 1 . . . . 15%
- Midterm 2 . . . . 15%
- Final Exam 30%

Final letter grades will be assigned based on the following scheme:

- A 93-100%
- A- 90-92%
- B+ 87-89%
- B 83-86%
- B- 80-82%
- C+ 77-79%
- C 70-76%
- C- 65-69%
- D+ 60-64%
- D 55-59%
- D- 50-54%
- E 0-49%

A grade of "C" or above is required for advancement to the next course in the sequence, MATH 1320. The grading scheme may be adjusted, only to help the students, if it is deemed necessary.

Homeworks will be assigned weekly, to be due on Wendesdays, not on exam weeks, and on the Tuesday of the last day of classes, for a total of 12 homework assignments. The lowest 2 homework grades will be dropped. As a result, **no late homework submissions will be accepted**. There will also be a total of 12 short (5-10min) weekly quizzes assigned at the beginning of the class on Fridays (not on exam weeks) to check understanding. The lowest 2 quiz scores will also be dropped. If a student has a valid reason for missing class on a Friday, **they must make up the quiz before the second class day after the quiz** (by Tuesday on regular weeks and by Wednesday when we have Mondays off). Labs will be held weekly and lab assignments will be turned in the following week's lab period. Similarly, **no late lab submissions will be accepted** and the lowest 2 lab grades will be dropped. On exam weeks, the lab will be held as a review with no required submission.

Midterm 1 is currently planned for Friday February 14th. Midterm 2 is currently planned for Friday March 28th. The final exam is on Tuesday April 29th from 10:30am-12:30pm in our classroom, WEB 1250. It is a comprehensive exam that will emphasize the later material covered in class. The score (percentage) on your lowest midterm will be replaced with your score (percentage) on your final exam if it would help your grade.

The letter grade assignment may be updated, only to help student's grades, depending on the status of the course.

Tutoring Resources: The Mathematics Student Center offers tutoring in the basement of the math buildings (JWB & LCB), in FASB, and online. All math tutoring center locations are closed during semester breaks and University holidays. If you have questions, please email Lisa Penfold, Director of Undergraduate Services, at ugrad_services@math.utah.edu, or visit her in the Math Center, room 155A. For more information, visit their webpage: www.math.utah.edu/undergraduate/mathcenter.php.

Additionally, the Learning Center provides free, individual support for 200+ courses. Individual tutoring is available to all currently-enrolled University of Utah students for free. Appointments can be scheduled for

30 minutes or 60 minutes and may take place in person (M LIB 1705 A) or via Zoom. Students may schedule up to 2 hours of tutoring appointments each day. For more information, email the Tutor Coordiantor at Theresa.Hyland@utah.edu or visit the webpage learningcenter.utah.edu/individual_tutoring/.

Diversity and Belonging: I stand in support of compassion, dignity, value-of-life, fair treatment, belonging, and justice for all individuals regardless of color, race/ethnicity, sexual orientation, religion, language, socioeconomic status, ability, gender, gender identity or expression, immigration status, or any type of marginalization. I stand in support of making our society more fair and compassionate for all individuals. I stand against discrimination in all its various forms.

Class rosters are provided to the instructor with the student's 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.

Americans with Disabilities Act (ADA): The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities.

All written information in this course can be made available in an alternative format with prior notification to the Center for Disability & Access (CDA). CDA will work with you and the instructor to make arrangements for accommodations. Prior notice is appreciated. To read the full accommodations policy for the University of Utah, please see Section Q of the Instruction & Evaluation regulations.

In compliance with ADA requirements, some students may need to record course content. Any recordings of course content are for personal use only, should not be shared, and should never be made publicly available. In addition, recordings must be destroyed at the conclusion of the course.

If you will need accommodations in this class, or for more information about what support they provide, contact:

Center for Disability & Access
801-581-5020
disability.utah.edu
65 Student Services Building
201 S 1460 E
Salt Lake City, UT 84112

Safety at the U: The University of Utah values the safety of all campus community members. You will receive important emergency alerts and safety messages regarding campus safety via text message. For more safety information and to view available training resources, including helpful videos, visit safeu.utah.edu.

To report suspicious activity or to request a courtesy escort, contact:

Campus Police & Department of Public Safety
801-585-COPS (801-585-2677)
dps.utah.edu
1735 E. S. Campus Dr.
Salt Lake City, UT 84112

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, you are encouraged to report it to university officials:

Title IX Coordinator & Office of Equal Opportunity and Affirmative Action
801-581-8365
oeo.utah.edu
135 Park Building
201 Presidents' Cir.
Salt Lake City, UT 84112

Office of the Dean of Students
801-581-7066
deanofstudents.utah.edu
270 Union Building
200 S. Central Campus Dr.
Salt Lake City, UT 84112

To file a police report, contact:

Campus Police & Department of Public Safety
801-585-COPS (801-585-2677)
dps.utah.edu
1735 E. S. Campus Dr.
Salt Lake City, UT 84112

If you do not feel comfortable reporting to authorities, the U's Victim-Survivor Advocates provide free, confidential, and trauma-informed support services to students, faculty, and staff who have experienced interpersonal violence.

To privately explore options and resources available to you with an advocate, contact:

Center for Campus Wellness
801-581-7776
wellness.utah.edu
350 Student Services Building
201 S. 1460 E.
Salt Lake City, UT 84112

Academic Misconduct: It is expected that students comply with University of Utah policies regarding academic honesty, including but not limited to refraining from cheating, plagiarizing, misrepresenting one's work, and/or inappropriately collaborating. This includes the use of generative artificial intelligence (AI) tools without citation, documentation, or authorization. Students are expected to adhere to the prescribed professional and ethical standards of the profession/discipline for which they are preparing. Any student who engages in academic dishonesty or who violates the professional and ethical standards for their profession/discipline may be subject to academic sanctions as per the University of Utah's Student Code: Policy 6-410: Student Academic Performance, Academic Conduct, and Professional and Ethical Conduct.

Plagiarism and cheating are serious offenses and may be punished by failure on an individual assignment, and/or failure in the course. Academic misconduct, according to the University of Utah Student Code:

> *"...Includes, but is not limited to, cheating, misrepresenting one's work, inappropriately collaborating, plagiarism, and fabrication or falsification of information...It also includes facilitating academic misconduct by intentionally helping or attempting to help another to commit an act of academic misconduct."*

For details on plagiarism and other important course conduct issues, see the U's Code of Student Rights and Responsibilities.