MATH 1320: Engineering Calculus II

Section 015

Spring 2026

Last updated: January 10, 2026

Instructor:	Filip Bělík	**Email:**	filip.belik@utah.edu
Time:	MTWF 2:00pm – 2:50pm	**Place:**	AEB 350
Lab TA 1:	Erin Szalda-Petree	**Email:**	u1530931@utah.edu
Lab TA 2:	Nathan Mihm	**Email:**	u1594809@utah.edu
Lab 1:	Th 2:00pm in LCB 121	**Lab 2:**	Th 2:00pm in AEB 306

Office Hours: Mondays from 1:00pm-2:00pm and Tuesdays from 9:00am-10:00am. I am also happy to meet with you at other times if neither of these work for you, please reach out to me if this is the case. I will either be in my office, **LCB 302**, or in the **LCB Loft** (4th floor) depending on how many people come to office hours; check both places for me.

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.

You have the option to purchase an e-textbook which is then paid through student fees which you would be able to access on Bookshelf via Canvas.

Objectives: The goal of MATH 1320 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 be able to utilize methods of integration to compute volumes of objects with circular-shaped aspects, and compute lengths of curves. These applications introduce a higher-level concept of integration, involving the summation of small volume segments dV or small length segments ds, which are computed by performing an appropriate parameterization to a real-number-line integral in terms of dx.
- Students will be skilled in using integration to compute problems important in physics and engineering. Students will know how to compute of an average value of a function using the mean value theorem for integrals, the center of mass for objects, and the computation of energy as a force integrated over a distance. Students will also be able to utilize physical laws to formulate differential equations that solve for the motion of masses by forces of gravitation, friction, electrostatics, to name a few. Students will also become familiar with the phenomenon of exponential growth and decay in science and engineering contexts.
- Students will become skilled in computations and applications of infinite sequences and sums. Students will become familiar with the properties of infinite sums to either converge to a finite value or diverge to an infinite value, and will learn about methods to determine convergence. Students will be able to represent functions as a Taylor series, and use Taylor's theorem to approximate functions and estimate error from using finitely many terms of the Taylor series.
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- and 3-dimensional coordinate systems, vectors and vector operations including the dot and cross product, and equations of lines, planes, and other surfaces. Students will also learn how to represent motion of objects in 3D using vector functions, how to represent velocity and acceleration using vector

projections into tangential and centripetal coordinates of acceleration, and how to characterize curves in space by computing arc length and curvature. For functions of 3D surfaces, students will be able to characterize aspects of surfaces and volumes using partial derivatives and the gradient vector. Partial derivatives will also be used to describe approximating tangent planes to points on surfaces, and how to compute derivatives of multi-dimensional function compositions can be performed using a multi-dimensional version of the chain rule.

Problem Solving Fluency:

- Students will be able to read and understand problem descriptions, then be able to formulate equations modeling the problem usually by applying geometric or physical principles. Solving a problem often requires a series of transformations that include utilizing the methods of calculus. Students will be able to select the appropriate calculus operations to apply to a given problem, execute them accurately, and interpret the results using numerical and graphical computational aids.
- Students will gain experience with problem solving in groups. Students should be able to effectively transform problem objectives into appropriate problem solving methods through collaborative discussion. Students will also learn how to articulate questions effectively with both the instructor and TA, and be able to effectively articulate how problem solutions meet the problem objectives.

Required Prerequisites: At least one of the following is required for taking MATH 1310.

- "C" or better in MATH 1310 or MATH 1311
- AP Calc BC score of 3 or better
- 1320 can alternatively be entered by earning a "C" or better in MATH 1210 and by being concurrently enrolled in the MATH 1320 "boot camp" (MATH 13) that covers the material in 1310 that is missing from the traditional 1210 sequence
- Departmental consent

Tentative Course Outline:

- Week 1: 6.1-6.3 — Computing Areas, Volumes, Volumes by Shells
- Week 2: 6.4-6.6 — Arc Length, Average Values, Applications to Engineering
- Week 3: 8.1-8.2, 8.4 — Sequences, Series, Ratio Test
- Week 4: 8.5-8.7 — Power Series, Taylor and Maclaurin Series
- Week 5: 9.1, Midterm 1 — Three Dimensional Coordinates, Friday Exam
- Week 6: 9.2-9.4 — Vectors, Dot Product, Cross Product
- Week 7: 9.5-9.7 — Lines and Planes, Functions and Surfaces, Cylindrical and Spherical Coordinates
- Week 8: 10.1-10.3 — Vector Functions, Derivatives and Integrals, Arc Length, Curvature
- Week 9: 10.4-10.5, 11.1 — Velocity, Acceleration, Parametric Surfaces, Functions of Several Variables
- Spring Break
- Week 10: 11.1-11.2, Midterm 2 — Functions of Several Variables, Limits and Continuity, Friday Exam
- Week 11: 11.2-11.4 — Limits, Partial Derivatives, Tangent Planes, Linear Approximation
- Week 12: 11.5-11.7 — Chain Rule, Directional Derivatives, Gradient Vector, Extremal Values
- Week 13: 11.8, 12.1-12.2 — Lagrange Multipliers, Double Integrals, Iterated Integrals
- Week 14: 12.3-12.4, Review — Double Integrals over General Regions, Polar Coordinates, Review
- Week 15: Review, Final — Review week, Friday Final Exam

Important Dates:

- January 5: First day of classes
- January 9: Last day to add without a permission code

- January 9: Last day to wait list
- January 16: Last day to add, drop, and audit
- January 19: Martin Luther King Jr. Day (No class)
- February 6: Midterm 1
- February 16: President's Day (No class)
- March 6: Last day to withdraw from classes
- March 7-15: Spring break (No class)
- March 20: Midterm 2
- April 21: Classes end
- April 22: Reading day
- April 24, 1:00pm - 3:00pm: **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 10%
- Lab Quizzes 15%
- Lab Attendance 5%
- Midterm 1 ..... 20%
- Midterm 2 ..... 20%
- Final Exam 30%

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

- A 94-100%
- A- 90-93%
- B+ 87-89%
- B 83-86%
- B- 80-82%
- C+ 77-79%
- C 70-76%
- C- 67-69%
- D+ 63-67%
- D 60-63%
- D- 57-59%
- E 0-56%

A grade of "C" or above is required for advancement to the next course in the sequence, MATH 2250. The grading scheme may be adjusted 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**.

Labs will be held weekly in which students will work independently on a lab quiz and have the remainder of the hour to work together on practice problems or homework. Thus, **lab attendance is mandatory for the lab grade**. If you are unable to make lab one week, you must let me know in advance. Only a handwritten notecard is allowed for the lab quizzes for reference, otherwise no technology is allowed during the lab quiz. You are allowed to use technology for the collaborative portion of the lab. The lowest 2 lab quiz grades will be dropped.

Midterm 1 is currently planned for Friday February 6th. Midterm 2 is currently planned for Friday March 20th. The final exam is on Friday April 24th from 1:00pm-3:00pm in our classroom, AEB 350. 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. No technology is allowed to be used during the exam. You also will have no access to notes unless I decide otherwise for a particular exam.

Use of AI: As previously noted, AI is not allowed to be used in the lab quiz. Additionally, you will have no access to technology for the midterm exams. However, I do not restrict use of AI for homework or personal tutoring. However, the homework is intended to help prepare you for the exam by practicing problem solving. If you are copying and pasting from AI (or the internet), you are likely not learning the material well enough to pass the exam. If you wish to use AI, please **use it as a tool, not as a crutch**. Also, **make sure to check its sources or ask me if you are unsure of its work**. A big part of learning math is struggling through problem solving and thinking critically about problems rather than copying and pasting from an online source.

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.