

MATH 1310-4, Fall 2016

Engineering Calculus I

Lectures: MTWF 10:45-11:35 am, HEB 2004

Labs: Section 5: H 10:45-11:35 am, LCB 215
Section 6: H 9:40-10:30 am, LCB 215
Section 7: H 10:45-11:35 am, NS 204
Section 8: H 8:35-9:25 am, JWB 308

Instructor: Jingyi Zhu, 801-581-3236, zhu@math.utah.edu

Teaching Assistants: Elizabeth Winkelman (Sections 5-6), Xuesong Bai (Sections 7-8)

Office Hours: JZ: MWF 12:00-1:30 pm, LCB 335
XB: Tu 1:00 - 3:30 pm, JWB121, and Th 2:00 - 3:30 pm, WEB 1622
EW: Tu 12:30 - 1:30 pm, and Th 4:00 - 5:00 pm, WEB 1622

Class Webpages: Canvas and http://www.math.utah.edu/~zhu/1310_16f.html

Text: James Stewart, *Calculus: Concepts and Contexts, 4th Edition* (2010), Brooks/Cole Cengage Learning, ISBN-13:978-0-495-55742-5

Prerequisites: “C” or better in College Algebra and Trigonometry (MATH 1050 and MATH 1060), or
“C” or better in Precalculus (MATH 1080), or
AP Calc or AB score of 3 or better, or
Accuplacer CLM score of 95 or better, or
ACT Math score of 28 or better, or
SAT Math score of 630 or better, or
Department Consent

Course Description:

This course covers the essential materials in calculus with a special emphasis on engineering applications. It is organized in a weekly schedule that combines four lectures with one lab session. Topics for this semester include: functions and their graphs, exponential and logarithmic functions, inverse functions, velocity and acceleration, the concepts of limit and derivative, geometric applications of the derivative, rate of change, chain rule and product/quotient rules, differentiation of polynomial, rational, trigonometric, exponential, and logarithmic functions, l’Hopital’s Rule, minimum and maximum value problems, indefinite and definite integrals, the fundamental theorem of calculus, substitution rule, integration by parts, improper integrals, areas between curves and volumes.

Expected Learning Outcomes:

Upon successful completion of this course, a student should be able to

- 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.
- 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.
- 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.
- Use the limit definition of derivatives to obtain derivatives of polynomial, rational and some trigonometric functions; understand the concept of continuity.
- 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.
- 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 $y = f(x)$.
- 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.
- Understand the concept of indefinite integral as the antiderivative and the definite integral as the limiting value of a large sum.
- Compute indefinite and definite integrals, using the power rule and basic substitution and the Fundamental Theorems of Calculus.
- 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.

- Coursework:**
- Lab: On each Thursday, a TA will lead discussions on worksheet problems for your section which is much smaller than the lecture class. These in-depth problems are more challenging, and group efforts and computer technology may be helpful to complete these assignments which will be due on the following lab meeting day.
 - Homework: To be assigned weekly. Each set is assigned on a Friday and due one week later at 2 pm, collected in a box outside the instructor's office. Homework that is late but not more than one week late may be accepted with half credit. We do not accept any homework that is more than one week late.
 - Quizzes: A 10-minute quiz will be given on each Friday *at the beginning of the class*, except for the super quiz and midterm days. Two lowest scores will be dropped but no make-up will be given.
 - Super Quizzes: There will be three 20-minute super quizzes on **Fridays Sept 16, Oct 28, and Dec 2**, also at the beginning of the class. These problems are based on the materials covered since the last midterm or super quiz, and they are intended to prepare the students for the next midterm. One lowest score will be dropped but no make-up will be given.
 - Midterms: There will be two one-hour, in-class midterm exams on **Fridays Sept 30 and Nov 11**. Neither midterm can be dropped.
 - Final Exam: **Wednesday, Dec 14, 10:30 am - 12:30 pm**. The final exam is comprehensive and students must take the final to pass the course.

Table 1: Coursework Weights

Lab Sheets	Homework	Quizzes	S Quizzes	Midterms	Final Exam
15%	10%	8%	7%	30 %	30%

Information on Canvas:

All grades will be entered on Canvas, and some other materials such as solution notes and practice exams will also be posted there. You can log in to your canvas system on the University of Utah website using your student id and password that you use for Campus Information System. It is recommended that you keep all your work, and you should immediately notify the instructor for any data entry errors.

Exam Policies: Exams (midterm and final) will be closed book and closed notes. Calculators, laptops, and any other electronic devices will **not** be allowed. For each exam, a practice problem set will be posted on Canvas one week before the actual exam to help you to prepare. In case there is a scheduling conflict with other academic or university sponsored event, an early schedule may be arranged if it is brought up to the instructor at least one week prior to the exam.

Course Grade: The course letter grade will be determined from the weighted score for all components as in Table 2.

Table 2: Grading Scales

Total Percentage	90-100	85-89	80-84	75-79	70-74	65-69	60-64	55-59	45-54	0-44
Grade	A	A-	B+	B	B-	C+	C	C-	D	E

Withdrawals: Last day to add or drop (delete) is Sept 2. Until Oct 21 you can withdraw from class with no approval at all. After that date you must petition your dean's office to be allowed to withdraw.

Mathematics Tutoring Center:

Free tutorials are available in Rm 155 of the T. Benny Rushing Mathematics Center (connecting LCB and JWB). Hours are 8 am - 8 pm, Mondays through Thursdays, and 8 am - 6 pm on Fridays. For more information visit <http://www.math.utah.edu/ugrad/mathcenter.html>. The math department also has extensive taped calculus classes available online at <http://www.math.utah.edu/lectures/> which you may find helpful.

College of Engineering Tutoring Lab:

Additional office hours held by the TAs for the engineering calculus sequence (MATH 1310, MATH 1311, MATH 1320, MATH 1321, MATH 3140) and MATH 2250 will be scheduled in WEB 1622. Hours are 8 am - 5 pm Mondays through Thursdays. Detailed TAs hours will be posted once the schedule becomes available in the first week of the semester.

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 this class, reasonable prior notice needs to be given the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All information in this course can be made available in alternate format with prior notification to the Center for Disability Services (www.hr.utah.edu/oeo/ada/guide/faculty/)

Faculty and 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 the Faculty Rules and Regulations, it is faculty responsibility to enforce responsible classroom behaviors, beginning with verbal warnings and progressing to dismissal from class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee. Faculty must strive in the classroom to maintain a climate conducive to thinking and learning (PPM 6-316). Students have a right to support and assistance from the University in maintaining a climate conducive to thinking and learning (PPM 6-400).

Important Dates:

- August 22: Class begins
- September 2: Last day to add
- September 16: First super quiz
- September 30: First midterm
- October 21: Last day to withdraw with no approval
- October 28: Second super quiz
- November 11: Second midterm
- December 2: Third super quiz
- December 8: Class ends
- December 14: Final exam

Note:

The syllabus is not a binding legal contract. It may be modified by the instructor when the student is given reasonable notice of the modification.

Tentative Schedule

Week	Date	Sections	Topic
1	Aug 22 - 26	1.3-1.6	Functions, Compositions, Exp and Log, Inverse Functions
2	Aug 29 - Sept 2	1.7-2.2	Parametric Curves, Velocity, Limits
3	Sept 6 - 9	2.3-2.5	Continuity, Derivatives, Rate of Change
4	Sept 12 - 16	2.5-2.7	Relationship between a Function and its Derivative, Super Quiz
5	Sept 19 - 23	2.8-3.2	Derivatives of Polynomials and Exponentials, Product and Quotient Rules
6	Sept 26 - 30	3.3-3.5	Derivatives of Trig Functions, Chain Rule, Implicit Differentiation, Higher Derivatives, 1st Midterm
7	Oct 3 - 7 Oct 10 -14	3.6-3.8	Inverse Trig and Log Functions, and their Derivatives Fall Break
8	Oct 17 - 21	3.9-4.2	Linear Approx and Differentials, Related Rates, Max and Min Values
9	Oct 24 - 28	4.3-4.5	Derivatives and Shapes of Curves, Graphing, l'Hopital's Rule, Super Quiz
10	Oct 31 - Nov 4	4.6-4.8	Optimization, Newton's Method, Antiderivatives
11	Nov 7 - 11	5.1-5.3	Areas and Distances, Definite Integrals, 2nd midterm
12	Nov 14 - 18	5.4-5.6	Fundamental Theorem of Calculus, Substitution Rule, Integration by Parts
13	Nov 21 - 23	5.7-5.9	Integration Techniques, Approximate Integration
14	Nov 28 - Dec 2	5.10, 6.1	Improper Integrals, Areas between Curves, Super Quiz
15	Dec 5 - 8	6.2	Volume, Review
16	Dec 14		Final Exam