Calculus I

MATH 125, Fall 2024
Lecture Section 39498R: 9-9:50am, MWF, WPH B28
Lecture Section 39465R: 10-10:50am, MWF, THH 114
Prerequisite: MATH 108 or Placement Exam
Course Description: (4 units) Limits; continuity, derivatives and applications; antiderivatives; the fundamental theorem of calculus; exponential and logarithmic functions.

Instructor: Calum Rickard
Email: crickard@usc.edu
Office: Kaprielian Hall (KAP) 416A
Office Hours: MW 3:30-4:30pm, Tue 2-2:30pm, Thu 10-10:30am in KAP 416A
Also available to meet on Zoom during these hours by request.

Teaching Assistant Lecture Section 39498R: Ivan Feng
Email: ifeng@usc.edu
Office: Math Center, KAP 263
Office Hours: Wed 4-5pm, Thu 5-6pm, Fri 2-3pm in the Math Center, KAP 263
Discussion Section 39499R: 3-3:50pm, Tue Thu, DMC 206
Discussion Section 39522R: 4-4:50pm, Tue Thu, DMC 206

Teaching Assistant Lecture Section 39465R: Brian Fan
Email: brianfan@usc.edu
Office: Math Center, KAP 263
Office Hours: Tue 2-3pm, Thu 2-4pm in the Math Center, KAP 263
Discussion Section 39466R: 12-12:50pm, Tue Thu, KAP 167
Discussion Section 39467R: 1-1:50pm, Tue Thu, KAP 167

Textbook: *Essential Calculus*, by James Stewart, 2nd Edition (Required)
There will be no use of WebAssign for homework (see below), so all you require for the class is a hard copy or digital version of the text.

Homework: Will be assigned on Gradescope approximately every Wednesday (see Lecture Schedule below) and due on Gradescope by the following Wednesday at 11:59PM. Please sign up for Gradescope through the email received from Gradescope. You may also access Gradescope using the link on Brightspace.
No late homework will be accepted. Your two lowest homework grades will not be included when computing your final grade (see Grading below).

Quizzes: Will be held in discussion in-person approximately every Thursday (see Quiz Schedule below) covering the topics of the homework due the day before. You will have 20

minutes to complete each quiz. All quizzes are closed book (no notes) with no calculators allowed.
There will be two quiz retake opportunities during the semester: in the discussion after each midterm you will be allowed to retake a single (modified) quiz. Otherwise, there are no make up quizzes. Your two lowest quiz grades will not be included when computing your final grade (see Grading below).

Exams: Midterm 1: Wednesday, October 2, In Class Exam
Midterm 2: Wednesday, November 6, In Class Exam
On the midterms, you will be allowed to use handwritten notes of single standard index card size (3 inch by 5 inch) on both sides. No calculators.

Final Exam: Wednesday, December 11, 2-4pm, Location TBA
On the final, you will be allowed to use handwritten notes of single standard paper size (8.5 inch by 11 inch) on both sides. No calculators.
The final is a cumulative exam written by the math department. You must take the final to pass the class. It is university policy that no student may take this exam early.

Grading: Homework (15%), Quizzes (15%),
Midterm 1 (20%), Midterm 2 (20%),
Final Exam (30%)
Each homework assignment and quiz is worth an equal amount towards its respective component of your final grade. Your two lowest homework scores and two lowest quiz scores will be not be included when computing your final grade.

Course announcements, assignments and grades will be posted on Brightspace.

Course Communication: For general course questions including mathematical queries, this class will make use of Slack as a "quick" communication tool as you will be able to write brief sentences (questions, clarifications, etc.).

Click here to access the course Slack channel.

Questions will be answered by the instructor, teaching assistants and fellow students. As with regular & Brightspace email, using Slack should be viewed as a professional form of communication. Use Slack to ask general course questions including mathematical queries.

Topics Covered: We will cover most of Chapters 1-5 of the text. The main topics are:

- Limits and Continuity (Chapter 1)
- Derivatives (Chapters 2-3)

- Integrals (Chapter 4)
- Log and Exp (Chapter 5)

See below for detailed Learning Objectives.

Lecture Schedule (subject to change) & Quiz Schedule:
Section numbers are from the text which you can use as reading suggestions.

Date	**Sections**	**Topic**	**Homework (HW)**
Mon, Aug 26	1.3	The Limit of a Function	
Wed, Aug 28	1.4	Calculating Limits	HW 1 assigned
Fri, Aug 30	1.4	Calculating Limits	
Mon, Sep 2	No class	Labor Day	
Wed, Sep 4	1.5	Continuity	HW 1 due, HW 2 assigned
Thu, Sep 5		**Quiz 1**	
Fri, Sep 6	1.5, 1.6	Intermediate Value Theorem, Limits Involving Infinity	
Mon, Sep 9	1.6	Limits Involving Infinity	
Wed, Sep 11	2.1	Derivatives and Rates of Change	HW 2 due, HW 3 assigned
Thu, Sep 12		**Quiz 2**	
Fri, Sep 13	2.2	The Derivative as a Function	
Mon, Sep 16	2.3	Basic Differentiation Formulas	
Wed, Sep 18	2.4	The Product and Quotient Rules	HW 3 due, HW 4 assigned
Thu, Sep 19		**Quiz 3**	
Fri, Sep 20	2.5	The Chain Rule	
Mon, Sep 23	2.6	Implicit Differentiation	
Wed, Sep 25	2.7	Related Rates	HW 4 due
Thu, Sep 26		**Quiz 4**	
Fri, Sep 27	2.8	Linear Approximation and Differentials	
Mon, Sep 30	Sample Midterm 1	Midterm 1 review	
Wed, Oct 2		***Midterm 1***	HW 5 assigned
Thu, Oct 3		**Quiz retake opportunity**	
Fri, Oct 4	3.1	Maximum and Minimum Values	
Mon, Oct 7	3.1	Maximum and Minimum Values	

Date	**Sections**	**Topic**	**Homework (HW)**
Wed, Oct 9	3.2	The Mean Value Theorem	HW 5 due, HW 6 assigned
Thu, Oct 10	No quiz	Fall Recess	
Fri, Oct 11	No class	Fall Recess	
Mon, Oct 14	3.3	Derivatives and the Shapes of Graphs	
Wed, Oct 16	3.4	Curve Sketching	HW 6 due, HW 7 assigned
Thu, Oct 17		**Quiz 5**	
Fri, Oct 18	3.5	Optimization Problems	
Mon, Oct 21	3.7	Antiderivatives	
Wed, Oct 23	4.1	Areas and Distance	HW 7 due, HW 8 assigned
Thu, Oct 24		**Quiz 6**	
Fri, Oct 25	4.2	The Definite Integral	
Mon, Oct 28	4.2, 4.3	The Definite Integral, Evaluating Definite Integrals	
Wed, Oct 30	4.4	The Fundamental Theorem of Calculus Part I	HW 8 due
Thu, Oct 31		**Quiz 7**	
Fri, Nov 1	4.5	The Substitution Rule	
Mon, Nov 4	Sample Midterm 2	Midterm 2 review	
Wed, Nov 6		***Midterm 2***	HW 9 assigned
Thu, Nov 7		**Quiz retake opportunity**	
Fri, Nov 8	5.1	Inverse Functions	
Mon, Nov 11	No class	Veterans Day	
Wed, Nov 13	5.2	The Natural Logarithmic Function	HW 9 due, HW 10 assigned
Thu, Nov 14		**Quiz 8**	
Fri, Nov 15	5.2	The Natural Logarithmic Function	
Mon, Nov 18	5.3	The Natural Exponential Function	
Wed, Nov 20	5.4	General Logarithmic Functions	HW 10 due, HW 11 assigned
Thu, Nov 21		**Quiz 9**	
Fri, Nov 22	5.4	General Logarithmic Functions	
Mon, Nov 25	5.5	Exponential Growth and Decay	
Wed, Nov 27	No class	Thanksgiving Holiday	
Thu, Nov 28	No quiz	Thanksgiving Holiday	

Date	Sections	Topic	Homework (HW)
Fri, Nov 29	No class	Thanksgiving Holiday	
Mon, Dec 2		Final Exam review	
Wed, Dec 4		Final Exam review	HW 11 due
Thu, Nov 5		**Quiz 10**	
Fri, Dec 6		Final Exam review	
Wed, Dec 11		***Final Exam***	

Learning Objectives: By the end of this course, you should be able to:

1. Limits: Evaluate the limit of a function graphically, numerically, or algebraically, or using the squeeze theorem without using L'Hopital's Rule (1.3, 1.4, 1.6)
2. Continuity: Use limits to determine whether a function is continuous at a point or over an interval (1.5)
3. Differentiability: Determine whether a function is differentiable and evaluate the derivative of a function from the limit definition of the derivative, and use basic derivative rules (2.1-2.3, 5.2-5.4)
4. Derivative rules: Evaluate the derivative of a function using the product, quotient, or chain rules, and logarithmic differentiation (2.4-2.5)
5. Interpreting derivatives and Linearization: Interpret the derivative graphically, numerically, or in applications, and use it to find the linearization of a function at a point and use it to approximate the value of a function (2.1, 2.2, 2.8)
6. Implicit Differentiation and Related Rates: Accurately use implicit differentiation to get an expression for the derivative for a given equation and apply this to set up and solve related rates problems. (2.6, 2.7)
7. Extrema: Use derivatives of a function to find the critical points and classify the critical point as a local max or min, and find global extrema (3.1)
8. Graphing: Use derivative and limits to accurately identify intercepts, horizontal and vertical asymptotes, global and local extrema, intervals of increase/decrease, intervals of concavity, and points of inflection, and accurately sketch the graph of a function (3.3, 3.4)
9. Optimization: Accurately set up optimization problems and use derivatives to solve them (3.5)
10. Intermediate Value Theorem and Mean Value Theorem: Use the IVT to determine whether a function attains a given value, or show it has a root or an equation has a solution and use the MVT to determine whether a function attains a given mean value (1.5, 3.2)

11. Applying Antiderivatives: Evaluate general antiderivatives and indefinite integrals and specific antiderivatives of functions given an initial condition and apply this to physics problems (3.7, 4.2, 4.5)
12. Definite Integral: Evaluate and estimate a definite integral from the definition as a limit of a Riemann sum or interpreting as area (4.1, 4.2, 4.4)
13. Fundamental Theorem of Calculus: Explain the relationship between derivatives and integrals using the Fundamental Theorem of Calculus, and apply FTCII to evaluate definite integrals and use FTCI to evaluate the derivative of an integral along with using the chain rule (4.3, 4.4, 4.5)
14. Substitution: Evaluate indefinite and definite integrals using substitution (4.5)
15. Invertibility and Exponential Growth and Decay: Using derivatives, determine whether a function is one-to-one/injective to determine whether or not it is invertible, and calculate the derivative of the inverse, and solve problems using exponential growth and decay (5.1-5.5)

The section numbers above are from the text.

Policies and Statements:

Class Recordings & Virtual Lectures: Attendance in-person is recommended but if needed you are able to attend lectures live virtually using the "USC Zoom" link found under "Course Tools" on the class Brightspace page. You must obtain permission from the instructor prior to attending a lecture virtually. You should keep your microphone muted, but you may unmute yourself to ask questions. You can also watch recordings of lectures posted in "USC Zoom" under "Course Tools" on the class Brightspace page.

Midterm absences: To protect academic integrity, all midterm exams must be taken in-person on the day the midterm is given in class. Due to the challenge of calibrating the difficulty of a midterm, there are no make-up midterms. If you anticipate missing a midterm, you must inform me with at least 24 hours notice (or in the case of an emergency, as soon as possible given the circumstances). Your other exams (including the final) will then be weighted to compensate.

Incomplete grade: If you miss the final for a documented emergency, you will receive a grade of IN. Consult the Office of Academic Records and Registrar for more information about an IN grade.

Students and disability accommodations: USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students

who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Course Content Distribution and Student Recording Policies: USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. (Living our Unifying Values: The USC Student Handbook, page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relation to the class, whether obtained in class, via email, on the internet, or via any other media. Distributing course material without the instructor's permission will be presumed to be an intentional act to facilitate or enable academic dishonestly and is strictly prohibited. (Living our Unifying Values: The USC Student Handbook, page 13).

Statement on Academic Integrity: The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, compromises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for

other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the student handbook or the Office of Academic Integrity's website, and university policies on Research and Scholarship Misconduct.

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

Support Resources:

Math Center:
The USC Math Center (KAP 263) is a place to go if you want help with your math classes. Please visit the Math Center website for more information.

Counseling and Mental Health:
Phone: (213) 740-9355 (available 24/7)
Website: https://sites.usc.edu/counselingandmentalhealth/
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

988 Suicide and Crisis Lifeline:
Phone: 988 for both calls and text messages (available 24/7)
Website: https://988lifeline.org/
The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline consists of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a

continued commitment to those in crisis.

Relationship and Sexual Violence Prevention Services (RSVP):
Phone: (213) 740-9355 (24/7, press "0" after hours)
Website: https://sites.usc.edu/clientservices/
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity, Equal Opportunity, and Title IX (EEO-TIX):
Phone: (213) 740-5086
Website: https://eeotix.usc.edu/
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment:
Phone: (213) 740-2500
Website: https://report.usc.edu/
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title IX for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS):
Phone: (213) 740-0776
Website: https://osas.usc.edu/
OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention:
Phone: (213) 740-0411
Website: https://campussupport.usc.edu/
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC:
Phone: (213) 740-2101
Website: https://diversity.usc.edu/
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency:
Phone: UPC: (213) 740-4321, HSC: (323) 442-1000 (available 24/7)
Website: https://www.usc.edu/emergency/
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety:
Phone: UPC: (213) 740-6000, HSC: (323) 442-1200 (available 24/7)
Website: https://dps.usc.edu/
Non-emergency assistance or information.

Office of the Ombuds:
Phone: UPC: (213) 821-9556, HSC: (323) 442-0382
Website: https://ombuds.usc.edu/
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice:
Phone: (323) 442-2850
Email: otfp@med.usc.edu
Website: https://chan.usc.edu/patient-care/faculty-practice
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.