MATH 125: Calculus 1 (Fall 2024, 4 units)

Lectures

Section 39462D: MWF 10-10:50 am in KAP 144

Section 39477R: MWF 12-12:50 pm in KAP 146

Instructor: Pranava C Jayanti, pjayanti@usc.edu (please include "Math 125" in the subject line)

Office Hours: TBD in KAP 416F (and also via Zoom)

https://usc.zoom.us/j/92587312373?pwd=dmMxUE13eGRnYnFNcnJXMVVENUlJdz09

Meeting ID: 925 8731 2373   Passcode: 360725

Discussion sessions

Section 39463R: TuTh 2-2:50 pm in KAP 140

Section 39464R: TuTh 3-3:50 pm in KAP 140

Teaching Assistant: Linshan Gao, frankgao@usc.edu

Office Hours: TBD

Section 39478R: TuTh 10-10:50 am in KAP 148

Section 39479R: TuTh 11-11:50 am in KAP 138

Teaching Assistant: Anna Sajan, sajan@usc.edu

Office Hours: TBD

Math Center

Your TA will hold office hours in the Math Center (located at KAP 263), from the second week of classes. You may visit the Math Center at any operational hour (Mon-Thu 8am-7pm, Fri 8am-5pm) and there will likely be someone there to help you.

Course Content

This course aims to introduce you to some of the most basic ideas in calculus, a field of mathematics that has wide-ranging applications in the applied sciences and engineering. We will discuss most of chapters 1, 2, 3, 4, and 5 from the textbook (see below). This will include limits, continuity, derivatives, extrema, definite integrals, and the fundamental theorem of calculus, among other topics.

Prerequisites

MATH 108.

Learning Objectives

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: Interpreting the derivative graphically, numerically, or in applications, and using 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: Using 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. <u>Applying Antiderivatives</u>: 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. <u>Definite Integral</u>: 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. <u>Fundamental Theorem of Calculus</u>: 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. <u>Substitution</u>: Evaluate indefinite and definite integrals using substitution.
15. <u>Invertibility and Exponential Growth and Decay</u>: 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)

Textbook

The main source for the lectures is *Essential Calculus* by James Stewart, 2nd Edition. If any other reference material is used, it will be provided during the course. Homework problems may be assigned from the textbook, so it would be helpful to have a copy of the textbook (physical or electronic). But make sure that you get the correct edition!

Course Notes

Lectures will be delivered in person, using a combination of the blackboard and an iPad. If necessary, I will share notes on Brightspace. I highly recommend going through the many solved examples that the textbook contains.

Distribution or use of notes or recordings based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study is a violation of the USC Student Conduct Code. This includes, but is not limited to, providing materials for distribution by services publishing class notes. 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.

Communication

Announcements will be made in class and via Brightspace, so please check the latter regularly for notifications (or ensure that email notifications are switched on). The best way for you to contact me is via email or during the designated office hours.

Technological Proficiency and Hardware/Software Required

No softwares will be used in this course, except Brightspace and Gradescope. Zoom may be used in case I am traveling at any point of the semester.

You will not need, and therefore will not be allowed to use, calculators during quizzes and exams. You may use a calculator for your homework if you wish, but you will not usually need it.

Below are some links that may be helpful.

USC Technology Support Links

Zoom information for students

Brightspace help

Software available to USC Campus

Additional online resources

- Desmos: This is an online graphing calculator that you may find useful to visualize and manipulate functions.
- Wolfram Alpha: This is an online computational engine that can perform various operations in calculus (and much more!).

Homework assignments

Homework will be assigned approximately once a week on Brightspace/Gradescope, and will consist of ~20 problems, some chosen from the textbook and some extra. The assignments will be graded and your scores will be entered on Brightspace in about a week or so.

- Late work will not be tolerated unless there is a reasonable excuse (medical/religious/emergency).
- Penalty for late assignments: 10% reduction in score for 0-12 hours after the deadline, 20% for 12-24 hours, 30% for 24-36 hours, and 40% for 36-48 hours. Submissions will not be accepted more than 48 hours after the deadline.
- No extensions are granted once the HW solutions are discussed/posted.

Here's a tentative homework schedule (subject to change, if necessary):

Homework #	Date assigned	Date due	Sections covered

1	26th Aug	6th Sep	1.1 - 1.4
2	6th Sep	18th Sep	1.4 - 1.6, 2.1
3	16th Sep	27th Sep	2.2 - 2.5
4	25th Sep	4th Oct	2.6 - 2.8
5	2nd Oct	18th Oct	3.1 - 3.3
6	16th Oct	25th Oct	3.4 - 3.5, 3.7
7	23rd Oct	1st Nov	4.1 - 4.3
8	1st Nov	13th Nov	4.4 - 4.5
9	13th Nov	22nd Nov	5.1 - 5.3
10	22nd Nov	4th Dec	5.4 - 5.5

Quizzes

Quizzes will be conducted on Tuesdays in discussion sessions. Of 12 quizzes conducted, the lowest two scores will be dropped. Each quiz will last ~10 minutes and will test your basic understanding of the concepts discussed in the week prior (and in the corresponding homework). You are permitted to refer to the textbook and your own notes while taking the quizzes. They will be graded by the TA and the scores uploaded to Brightspace, usually within a week. There will be no quiz in the weeks of the midterm exams.

- If you anticipate missing a quiz due to a planned absence (like travel/religious reasons), please send an email to me (cc-ing your TA) to discuss the possibility of a make-up quiz.
- If you miss a quiz due to underlined absence, there will be no make-up quiz. You will receive a 0 on that quiz, and it will become one of the two scores that will be dropped.

Quiz #	Date	Topics
1	3rd Sep	1.1 - 1.3
2	10th Sep	1.4 - 1.5
3	17th Sep	1.5 - 1.6, 2.1
4	24th Sep	2.2 - 2.4
5	1st Oct	2.5 - 2.7
6	15th Oct	2.8, 3.1 - 3.2

7	22nd Oct	3.3 - 3.5
8	29th Oct	3.7, 4.1
9	12th Nov	4.2 - 4.4
10	19th Nov	4.5, 5.1
11	26th Nov	5.2 - 5.3
12	3rd Dec	5.4 - 5.5

Midterm exams

There will be two <u>in-class</u> midterms (50 minutes each) conducted during the semester, tentatively on **Wednesday, October 9th 2024** and **Friday, November 8th 2024**. Both exams will be conducted during <u>regular class hours</u>, and the solutions will be posted to Brightspace afterwards.

Midterm - 1	Oct 9th 2024	Chapters 1, 2
Midterm - 2	Nov 8th 2024	Chapters 3, 4 (minus Sections 3.6, 4.4, 4.5)

For the midterm exams, you will NOT be allowed any cheat sheets or calculators.

- If you need to miss the midterm exams due to any planned absence, please let me know at the beginning of the semester.
- For any unplanned absences, there will be <u>no make-up exam</u>. Your midterm will be scored as zero. (Please see the grading breakdown below for clarification.)
- <u>If you miss both midterms, you will be recommended to drop the course</u>, since the final will not be reweighted to account for both missed exams (one of your midterms will therefore be counted as an *actual zero*).

Final exam

The end-of-semester exam (common across all sections of the course) will be conducted on **<u>Wednesday, Dec 11th 2024 from 2 pm to 4 pm in (venue TBD)</u>**. Please keep this date in mind. For the final exam, you will be allowed one sheet (front and back) of *handwritten* notes on a standard 8.5"x11" paper. No calculators permitted.

Final exam	Dec 11th 2024: 2 pm - 4 pm (venue TBD)	Chapters 1, 2, 3, 4, 5 (minus Sections 3.6, 5.6, 5.7, 5.8)

- There are <u>no make-ups</u> for the final exam. No student can take it earlier or later than the scheduled time. If the final exam poses a conflict with religious observances or any pre-planned activity, <u>please contact me as early as possible</u>.
- In certain situations, due to documented emergencies, students take an Incomplete (IN) grade. More information regarding policies for finals may be found [here](#).
- If you miss the final exam without providing me any notice, you will fail the course.

Grading Breakdown

Mode of evaluation	Fraction of Grade
Homework	10%
Quizzes	20%
Exams	70%
Total	**100%**

The exam score of 70% will be calculated as the best of the following numbers:

- 20% Midterm-1 + 20% Midterm-2 + 30% Final
- 30% Midterm-1 + 40% Final
- 30% Midterm-2 + 40% Final

Grading Scale

Letter grades will be assigned at the end of the semester, after grading "on a curve" to account for averages that are lower than usual. These variations notwithstanding, a very rough estimate for the grades would be as follows – A for >90%, B for 80-90%, C for 70-80%, D for 60-70%, with pluses and minuses distributed appropriately.

Important dates

Task	Deadline
Last day to add course or change to Pass/No Pass	Fri, Sep 13th 2024
Last day to drop without a mark of "W" and receive a refund	

Last day to withdraw without a "W" on transcript or change pass/no pass to letter grade	Fri, Oct 11th 2024
Last day to drop with a mark of "W"	Fri, Nov 15th 2024

More details can be found [here](#).

Attendance

Lectures will be delivered in-person, and will not be streamed or recorded. As a matter of principle, I do not enforce attendance in my courses (you are all adults, and I shall treat you as such!). However, coming to lectures, paying attention, and actively participating with questions/comments is *very strongly* advised. While this is an introductory calculus course, it may also be one of your first forays into university-level education. It is easy to feel lost if you miss a few classes, so please work consistently to stay up to date with the course material.

That being said, I will make every effort to help those with reasonable excuses. If you have to miss class due to religious observances during the semester, please let me know your schedule as early as possible in the semester, so that we can work to accommodate your absence. In case of medical reasons, please contact me via email as soon as it is possible for you to do so.

Course evaluation

Course evaluations at the end of the semester are a great way for me to receive feedback from you – this will help me improve my teaching, making it a better experience for both me and the next batch of students.

Of course, you don't have to wait until the end of the semester for this. If you wish to contact me with any suggestions/requests during the semester, please do not hesitate to do so. You may use [this Google form](#) to provide your feedback __anonymously__ if you prefer that.

Course Schedule: A Weekly Breakdown

A tentative course schedule is as follows. It is subject to change throughout the semester, so please check it regularly and look out for alerts on Blackboard.

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Week 1	8/26: 1.1, 1.2	8/27: No discussion	8/28: 1.2, 1.3	8/29: Discussion	8/30: 1.3

Week 2	9/2: Labor Day	9/3: Quiz 1	9/4: 1.4	9/5: Discussion	9/6: 1.5; HW-1
Week 3	9/9: 1.5, 1.6	9/10: Quiz 2	9/11: 1.6	9/12: Discussion	9/13: 2.1
Week 4	9/16: 2.2	9/17: Quiz 3	9/18: 2.3; HW-2	9/19: Discussion	9/20: 2.4
Week 5	9/23: 2.5	9/24: Quiz 4	9/25: 2.5, 2.6	9/26: Discussion	9/27: 2.7; HW-3
Week 6	9/30: 2.8	10/1: Quiz 5	10/2: 3.1	10/3: Discussion	10/4: 3.1; HW-4
Week 7	10/7: 3.2	10/8: Discussion	**10/9: Midterm-1**	10/10: Fall Recess	10/11: Fall Recess
Week 8	10/14: 3.3	10/15: Quiz 6	10/16: 3.4	10/17: Discussion	10/18: 3.5; HW-5
Week 9	10/21: 3.7	10/22: Quiz 7	10/23: 4.1	10/24: Discussion	10/25: 4.1; HW-6
Week 10	10/28: 4.2	10/29: Quiz 8	10/30: 4.3	10/31: Discussion	11/1: 4.4
Week 11	11/4: 4.5	11/5: Discussion	11/6: Buffer; HW-7	11/7: Discussion	**11/8: Midterm-2**
Week 12	11/11: Veterans' Day	11/12: Quiz 9	11/13: 5.1; HW-8	11/14: Discussion	11/15: 5.1
Week 13	11/18: 5.2	11/19: Quiz 10	11/20: 5.3	11/21: Discussion	11/22: 5.4; HW-9
Week 14	11/25: 5.5	11/26: Quiz 11	11/27: Thanksgiving	11/28: Thanksgiving	11/29: Thanksgiving

Week 15	12/2: Extra topics	12/3: Quiz 12	12/4: Review; HW-10	12/5: Discussion	12/6: Review
Finals Week	12/9: Office hours		**12/11: Final Exam (2 pm - 4 pm)**		

Statement on Academic Conduct and Support Systems

Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on Research and Scholarship Misconduct.

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.

Support Systems

- *Counseling and Mental Health - (213) 740-9355 – 24/7 on call*

  studenthealth.usc.edu/counseling

  Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

- *National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call*

  suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

- *Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call*

  studenthealth.usc.edu/sexual-assault

  Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

- *Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086*

  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 - (213) 740-5086 or (213) 821-8298*

  usc-advocate.symplicity.com/care_report

  Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

- *The Office of Student Accessibility Services (OSAS) - (213) 740-0776*

  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 - (213) 821-4710*

  campussupport.usc.edu

  Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

- *Diversity, Equity and Inclusion - (213) 740-2101*

  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 - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call*

dps.usc.edu, emergency.usc.edu

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 - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call*

dps.usc.edu

Non-emergency assistance or information.

- *Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)*

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 - (323) 442-33*40 or otfp@med.usc.edu

chan.usc.edu/otfp