

# Math 11A: Calculus with Applications

Summer 2024 - Session 2

MWF 1:00-3:30PM PDT

Synchronous Online

## **Instructor Information:**

**Name:** Sophie Aiken; call me “Sophie”  
(she/her/hers)

**Email:** ausaiken@ucsc.edu

**Office Hours:** T/Th 1:00-2:00pm PDT

**Access via the [zoom tab on canvas](#).**

**Meeting ID:** 930 7936 9243

**Passcode:** 060177

## **Teaching Assistant Information:**

**Name:** Abhinav Krishna Jha

**Email:** abhinav@ucsc.edu

**Office Hours:** TBD

**Link:** TBD

**Meeting ID:** TBD

**Passcode:** TBD

**Project Work Time:** TBD

**Link:** TBD

## **LSS Tutor Information:**

**Name:** Kate Wang

**Email:** kafwang@ucsc.edu

Students can **sign-up for tutoring on Monday, July 29th** at 12pm on [TutorHub](#).

Sessions **begin Thursday, August 1st.**

### **Sessions:**

Thursday 7-8 PM

Friday 10:30-11:30 AM

Sunday 9-10 AM

**\*\*Session Changes 8/11 - 8/19\*\***

8/11 (Sunday): 6-7 PM

8/15 (Thursday), 8/16 (Friday): 7-8 PM

8/19 (Sunday): 3-4 PM

## COURSE OVERVIEW

The main goal in this course is to understand what a derivative is, how to calculate it, and how it relates to the world around us and the science that we encounter in everyday life or in the lab.

This course will be taught in an **online synchronous** format. You will access the zoom room for class using the **zoom tab on the left of the canvas course page**. Once you click the zoom tab, you will see a blue link called *Calculus with Applications* for each day of class.

If for some reason the link does not work, you can access the room using **Meeting ID: 918 0530 2986** and **Passcode: 950573**.

There will be readings assigned to be completed before each class and then class time will be spent practicing techniques and clarifying concepts from the reading. It is important to **complete readings before attending class** to maximize your retention of material and your ability to engage during class time. See Course Outline below for more details.

## COMMUNICATION

**Office hours** are the best time to ask questions related to course content. This is a space where we can talk about questions you have from the readings, the in-class activities, or the homework. I may also be **available by appointment** if the above office hour times do not work for you. Summer is a busy time for us all, so feel free to reach out and we can try to schedule a time that works for both of us.

You can contact me anytime via **email** ([ausaiken@ucsc.edu](mailto:ausaiken@ucsc.edu)). I will do my best to respond within 24 hours during the work week, so if you need a quick response, it will be best to reach out to me Monday through Thursday. In the subject line of your email please include “Math 11A” so that I know right away it is an email regarding class. You can also contact me via the **canvas inbox** for this course.

We will also be using **Ed Discussion** on Canvas. This is a great place for you to post questions and receive hints/advice from your peers. I will check Ed Discussion once a day to answer any questions that you all were not able to answer for each other. When posting responses to questions, remember that everyone is trying their best to learn a new subject. Try to post hints rather than full answers so that everyone has a chance to work on the problems, and remember to use kind and respectful language.

## LEARNING OUTCOMES

Throughout this course, students will learn to:

1. *break down* a word problem/physical system in order to *formulate* the problem as an equation involving derivatives

2. *appreciate* how math can be a tool for you as a scientist in other disciplines and develop critical thinking skills to *identify* when different tools will be applicable
3. build confidence in *utilizing* mathematical ideas and *sharing* ideas through verbal and written communication
4. develop problem solving strategies that can be applied across disciplines and outside of academia
5. *accept mistakes* as an integral part of the learning process and *utilize* misconceptions as moments of growth while *reflecting* on their learning and studying strategies.

Content specific objectives:

6. *define* sequences and *evaluate* limits of sequences
7. *evaluate* limits of functions and *identify* the physical meaning of the end behavior of the function
8. *understand* and be able to *apply* the Intermediate Value Theorem and Squeeze Theorem for continuous functions
9. *understand* and *apply* the limit definition of a derivative
10. *examine* a derivative to *deduce* its physical meaning as an instantaneous rate of change
11. be able to *identify* the necessary derivative rule and *apply* it to complete the calculation
12. *Define* linear approximation and Taylor expansion and *describe* why it is useful to approximate a more complicated function with a linear one
13. *understand* L'Hopital's rule and use it to *predict* the relative growth rates of multiple functions
14. *define* antiderivative
15. *define* a system of differential equations and *explain* what it models about a physical system

## REQUIRED MATERIALS, TEXTBOOKS AND TECHNOLOGY

There are **no required textbooks** for this course. The canvas readings are adapted from *Biocalculus* by James Stewart and Troy Day. You can find a copy of *Biocalculus* under the "Resources" header in the "Introduction to the course" module on canvas. This may be a good resource if you are ever looking for more in depth or rephrased information.

You will be required to use **Edfinity**. Edfinity is an online homework platform that will allow you to receive instant feedback. This resource costs \$25-30, and you will be prompted to purchase it when you open the first Edfinity assignment through canvas.

## PREREQUISITES/COREQUISITES

If you would like to review the concepts from Math 3, check out Paul's Online Math Notes for [Algebra](#) and his chapter reviewing [prerequisites for Calculus 1](#). Focus on reviewing inverse

functions, trig functions, exponential and log functions (including log rules), and all of their graphs.

## DAILY CLASS STRUCTURE

You will be assigned a **group of peers** which you will work with throughout the summer session. You are expected to behave professionally and interact with your peers in constructive and meaningful ways.

### Group Roles

**Facilitator:** The facilitator should open the conversation by making sure their **group members know their roles for the day**. Throughout the group work activities, it will be up to the facilitator to **ensure that all students in the group participate** in the discussion.

**Content Ambassador:** The content ambassador will begin by **stating the day's learning outcomes**. They will then **read the question** to the group and open the discussion about the mathematics for the day. If the instructor asks for groups to **present**, it will be the content ambassador's responsibility.

**Consensus Leader:** The consensus leader's role is to ensure that **everyone agrees on their solutions**. Should students be unable to agree, the consensus leader will help to **pinpoint the cause of the disagreement** to add to their discussion work for the day. If consensus is reached, the consensus leader will **ensure that solution is recorded**.

**The Advocate:** The advocate's job is to **check the team's understanding**. The advocate will be responsible for **asking the instructor for additional help**; in order to do so, they must come to consensus with the group about the question and ensure that no one in the group has an answer.

**Administrator:** While all students should be contributing to the written document for the day (*this will be done via Google docs and/or slides*), the administrator's job will be to **ensure the notes are complete** and to ensure that the group **stays on time and on topic** throughout the session.

Class time breakdown:

Phase	Time	Description
Introduction & Announcement	10 min.	State daily learning objectives for the class, goals of the activities, group roles and deliverables for the class session.
Reading Review &	30 min.	The instructor will give direct feedback to the questions asked on Padlet and at times provide further examples.

Lecture		
Quiz: Individual Attempt	15 min.	You will be given a selection of problems to work through independently. You will not be given whether your solution is correct.
Quiz: Group Attempt	20 min.	In a breakout room with your group, you will discuss the questions and come to a consensus about correct answers and write out different methods to arrive at correct answers. Also write down common mistakes or confusions you notice.
Break	10 min.	The instructor will review your responses.
Quiz: Class Debrief	20 min.	The class will return together and the instructor will either ask groups to present their solutions or present the solution themselves.
Activity	30 min.	Work in groups on more open ended problems where you will be expected to grapple with concepts, work through guided exploration, create examples, and/or analyze methods and techniques.
Debrief	10 min.	Reminders about upcoming deadlines, office hours, etc.

## ASSIGNMENTS & ASSESSMENT

Your grade for this course will be built from the following assignments:

- **Pre-class** - 20%
  - Knowledge Checks - 10%
  - Reading Reflections - 10%
- **Homework** - 20%
  - Weekly Edfinity problem sets (some of which will be completed in class)
- **In Class Assessments** - 20%
  - Individual and Group Quizzes
  - Group Worksheets
  - Group Reviews
- **Project** - 40%
  - Project 1 - 15%
  - Project 2 - 25%
    - Draft 1 - 3%
    - Draft 2 - 3%
    - Final Draft - 19%

## GRADING POLICY

Assignment deadlines are created so that you can cover the needed material at a steady pace throughout the course. If there is a time when you cannot meet a deadline, reach out to me so that we can create a revised timeline for submission and feedback.

For the **project**, there is a grading rubric which you can access on canvas and use as a guide as you complete the project. If you have any questions about the rubric or what I am looking for in this project, please contact me so that we can both have a clear understanding of the expectations.

To account for **absences** in the quarter, your **four lowest scores on in-class assessments will be dropped** (this accounts for 2 daily quizzes and 2 group surveys)

**Final Grades** will be calculated using the following scale:

A: 90-100%

B: 80-89%

C: 70-79%

D: 60-69%

F: 0-59%

## Weekly Schedule

Please refer to the schedule below for important dates and assignment due dates throughout the session. Note that the schedule may be adjusted depending on the pace we set during the first few weeks.

Week	Monday	Wednesday	Friday
One	July 29 Read syllabus	July 31 Complete modules 1,2	Aug 2 Complete modules 3,4 Edfinity HW 1 due
Two	Aug 5 Complete module 5 Project 1 work day	Aug 7 Complete module 6 Project 1 due	Aug 9 Complete module 7,8 Edfinity HW 2 due
Three	Aug 12 Complete module 9	Aug 14 Complete module 10,11	Aug 16 Complete modules 12 Edfinity HW 2 due

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Course Syllabus

Summer 2024 - Session 2

Four	Aug 19 Complete module 13 Draft 1 of Project 2 due	Aug 21 Complete modules 14,15	Aug 23 NO READING Project 2 work day Draft 2 of Project 2 due Edfinity HW 2 due
Five	Aug 26 Complete modules 16,17	Aug 28 Complete module 18 Final of Project 2 due	Aug 30 Edfinity HW 2 due

**STUDENT FEEDBACK**

At the end of the quarter you will be asked to complete a Student Experience of Teaching survey for this course. SETs provide an opportunity for you to give valuable feedback on your learning that is honest and constructive. This anonymous feedback will help me consider modifications to the course that will help future students learn more effectively. I encourage you to skim through [CITL's Guide to Giving Useful Feedback to Instructors and TAs](#) before completing your SET survey.

Important Dates	
Session 2 Begins	<b>July 29</b> Monday
Session 2 Add/Swap	<b>August 1</b> Thursday
Session 2 Drop <i>Tuition reversal.</i>	<b>August 5</b> Monday
Session 2 Request "W" Grade <i>No tuition reversal.</i>	<b>August 18</b> Sunday
Session 2 Change Grade Option	<b>August 25</b> Sunday
Session 2 Ends	<b>August 30</b> Friday

## ACCESSIBILITY

UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, please affiliate with the DRC. I encourage all students to benefit from learning more about DRC services to contact DRC by phone at 831-459-2089 or by email at [drc@ucsc.edu](mailto:drc@ucsc.edu). For students already affiliated, make sure that you have requested Academic Access Letters, where you intend to use accommodations. You can also request to meet privately with me during my office hours or by appointment, as soon as possible. I would like us to discuss how we can implement your accommodations in this course to ensure your access and full engagement in this course.

*You can find more examples of accessibility and inclusivity statements in [CITL's Sample Syllabus Language](#).*

## TITLE IX/CARE ADVISORY

*You are encouraged to include a Title IX and CARE (Campus Advocacy, Resources & Education) statement in your syllabus to address your reporting responsibilities and to provide students with information on resources and support services. You are welcome to use the text below or alter it to suit your own needs. However, at a minimum, it is recommended that you inform students of the following: (1) University policy requires you to report Title IX misconduct, and (2) the CARE office offers confidential support. This sample statement was created in collaboration with the UC Santa Cruz Title IX Office and leadership at CARE.*

UC Santa Cruz is committed to providing a safe learning environment that is free of all forms of gender discrimination and sexual harassment, which are explicitly prohibited under Title IX. If you have experienced any form of sexual harassment, sexual assault, domestic violence, dating violence, or stalking, know that you are not alone. The Title IX Office, the Campus Advocacy, Resources & Education (CARE) office, and Counseling & Psychological Services (CAPS) are all resources that you can rely on for support.

Please be aware that if you tell me about a situation involving Title IX misconduct, I am required to share this information with the Title IX Coordinator. This reporting responsibility also applies to course TAs and tutors (as well to all UCSC employees who are not designated as “confidential” employees, which is a special designation granted to counselors and CARE advocates). Although I have to make that notification, you will control how your case will be handled, including whether or not you wish to pursue a formal complaint. The goal is to make sure that you are aware of the range of options available to you and that you have access to the resources you need.

Confidential resources are available through [CARE](#). Confidentiality means CARE advocates will not share any information with Title IX, the police, parents, or anyone else without explicit permission. CARE advocates are trained to support you in understanding your rights and options, accessing health and counseling services, providing academic and housing accommodations, helping with legal protective orders, and more. You can contact CARE at (831) 502-2273 or [care@ucsc.edu](mailto:care@ucsc.edu).



In addition to CARE, these resources are available to you:

- If you need help figuring out what resources you or someone else might need, visit the [Sexual Violence Prevention & Response \(SAFE\) website](#), which provides information and resources for different situations.
- [Counseling & Psychological Services \(CAPS\)](#) can provide confidential counseling support. Call them at (831) 459-2628.
- You can report gender discrimination and sexual harassment and violence directly to the University's [Title IX Office](#) by calling (831) 459-2462 or by using their [online reporting tool](#).
- Reports to law enforcement can be made to the UC Police Department, (831) 459-2231 ext. 1.
- For emergencies, call 911.

*Note: The following statements are optional. You may choose to incorporate any or all of them as they are or (even better) revise them so that they are more relevant to your course or field.*

## ACADEMIC INTEGRITY

All members of the UCSC community benefit from an environment of trust, honesty, fairness, respect, and responsibility. You are expected to present your own work and acknowledge the work of others in order to preserve the integrity of scholarship.

Academic integrity includes:

- Following exam rules
- Using only permitted materials during an exam
- Viewing exam materials only when permitted by your instructor
- Keeping what you know about an exam to yourself
- Incorporating proper citation of all sources of information
- Submitting your own original work

Academic misconduct includes, but is not limited to, the following:

- Disclosing exam content during or after you have taken an exam
- Accessing exam materials without permission
- Copying/purchasing any material from another student, or from another source, that is submitted for grading as your own
- Plagiarism, including use of Internet material without proper citation
- Using cell phones or other electronics to obtain outside information during an exam without explicit permission from the instructor
- Submitting your own work in one class that was completed for another class (self-plagiarism) without prior permission from the instructor.
- Violations of the Academic Integrity policy can result in dismissal from the university and a permanent notation on a student's transcript. For the full policy and disciplinary procedures on academic dishonesty, students and instructors should refer to the [Academic Misconduct page](#) at the [Division of Undergraduate Education](#).

## INTELLECTUAL PROPERTY

The materials in this course are the intellectual property of their creators. As a student, you have access to many of the materials in the course for the purpose of learning, engaging with your peers in the course, completing assignments, and so on. You have a moral and legal obligation to respect the rights of others by only using course materials for purposes associated with the course. For instance, you are not permitted to share, upload, stream, sell, republish, share the login information for, or otherwise disseminate any of the course materials, such as: video and audio files, assignment prompts, slides, notes, syllabus, simulations, datasets, discussion threads. Conversely, any materials created solely by you (for example, your videos, essays, images, audio files, annotations, notes) are your intellectual property and you may use them as you wish.

## RELIGIOUS ACCOMMODATION

UC Santa Cruz welcomes diversity of religious beliefs and practices, recognizing the contributions differing experiences and viewpoints can bring to the community. There may be times when an academic requirement conflicts with religious observances and practices. If that happens, students may request reasonable accommodation for religious practices. The instructor will review the situation in an effort to provide a reasonable accommodation without penalty. You should first discuss the conflict and your requested accommodation with your instructor early in the term. You or your instructor may also seek assistance from the [Dean of Students office](#).

## PRINCIPLES OF COMMUNITY

*You may choose to involve students in the preparation of principles of community for your course. This allows students to be partners in deciding what guidelines you will collectively follow to ensure free, open, and respectful discussions. A sample of such principles follows.*

The University of California, Santa Cruz expressly prohibits students from engaging in conduct constituting unlawful discrimination, harassment or bias... [More here](#). I am committed to providing an atmosphere for learning that respects diversity and supports inclusivity. We need to work together to build this community of learning. I ask all members of this class to:

- be open to and interested in the views of others
- consider the possibility that your views may change over the course of the term
- be aware that this course asks you to reconsider some “common sense” notions you may hold
- honor the unique life experiences of your colleagues
- appreciate the opportunity that we have to learn from each other
- listen to each other’s opinions and communicate in a respectful manner
- keep confidential discussions that the community has of a personal (or professional) nature
- ground your comments in the texts we are studying. Refer frequently to the texts and make them the focus of your questions, comments, and arguments. This is the single most effective way to ensure respectful discussion and to create a space where we are all learning together.

## **REPORT AN INCIDENT OF HATE OR BIAS**

The University of California, Santa Cruz is committed to maintaining an objective, civil, diverse and supportive community, free of coercion, bias, hate, intimidation, dehumanization or exploitation. The Hate/Bias Response Team is a group of administrators who support and guide students seeking assistance in determining how to handle a bias incident involving another student, a staff member, or a faculty member. To report an incident of hate or bias, please use the following form: [Hate/Bias Report Form](#).

## **STUDENT SERVICES**

### **Counseling and Psychological Services**

Many students at UC Santa Cruz face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

### **Student Success and Engagement Hub**

The Division of Student Success provides campus-wide coordination and leadership for student success programs and activities across departments, divisions, the colleges, and administrative units.

### **Tutoring and Learning Support**

At Learning Support Services (LSS), undergraduate students build a strong foundation for success and cultivate a sense of belonging in our Community of Learners. LSS partners with faculty and staff to advance educational equity by designing inclusive learning environments in Modified Supplemental Instruction, Small Group Tutoring, and Writing Support. When students fully engage in our programs, they gain transformative experiences that empower them at the university and beyond.

### **Slug Support Program**

College can be a challenging time for students and during times of stress it is not always easy to find the help you need. Slug Support can give help with everything from basic needs (housing, food, or financial insecurity) to getting the technology you need during remote instruction.

To get started with SLUG Support, please contact the [Dean of Students](#) Office at 831-459-4446 or you may send us an email at [deanofstudents@ucsc.edu](mailto:deanofstudents@ucsc.edu).

### **Slug Help/Technology**

The ITS Support Center is your single point of contact for all issues, problems or questions related to technology services and computing at UC Santa Cruz. To get technological help, simply email [help@ucsc.edu](mailto:help@ucsc.edu).

**On-Campus Emergency Contacts**

For all other help and support, including the health center and emergency services, Click here to go to UCSC's [Emergency Services](#) page. Always dial 9-1-1 in the case of an emergency.