



MATH 317: Advanced Calculus of One Variable
Course Information Sheet
Summer 2024

1 Basic Information

Instructor: Amie Bray (amie.bray@colostate.edu)

Time/Location: M-F 10-11am Engineering 204

Course website: All information will be on Canvas.

Textbook: *Elementary Analysis: The Theory of Calculus, Second Edition*, by Kenneth A. Ross.

To download a free pdf version of this book, visit

<https://link.springer.com/book/10.1007/978-1-4614-6271-2> from an on campus computer or while connected to the CSU network.

Office hours: Mondays 11am - 12pm and Thursdays 11am - 1pm

Email policy: You may contact me by email at any time, though I may not respond after 7pm or on weekends. I may take up to 24 hours to respond, so I recommend starting assignments early.

2 Expectations

The goal of this course is to rigorously develop the theory of real numbers, limits, continuity, differentiation, and integration. While you have already developed an intuitive understanding of these topics in the calculus sequence, in this course, we will spend time writing rigorous definitions and carefully proving theorems previously taken as facts. The most important take away from this course is the development of *mathematical language*, namely

- reading mathematics;
- making sense of mathematical definitions;
- recognizing when to use which proof structures;
- understanding when an argument is complete.

The course is broken into three units with a noncumulative in class exam on the last Friday of each unit. **Each week, I will post reading assignments from the textbook, and the content for that week will be based on those reading assignments.** I will collect weekly homework assignments **in class** every Tuesday. Each Friday, not including exam days, there will be a vocabulary quiz.

2.1 Attendance

You are expected to attend class every day, to participate in class, to read the textbook, and to do the homework.



2.2 Grading Scheme

Your final grade in this course will be determined by:

Homework: 30%

Quizzes: 20%

Exam 1: 15%

Exam 2: 15%

Exam 3: 15%

Participation/Attendance: 5%

At the end of the term, I will compute final grades, no harsher than the following scale.

Grade	Percentage
A	90 – 100%
B	80 – 89%
C	70 – 79%
D	60 – 69%
F	0 – 59%

3 Essential Dates

It is your responsibility to keep track of the following dates.

CSU Academic Calendar Dates

June 10, 2024 Classes Begin

June 17, 2024 Drop/Add Deadline

June 19, 2024 and July 4, 2024 University holidays, no classes

July 23, 2024 Last day to withdraw

July 28, 2024 Last day to apply for repeat/repair

Friday, August, 2, 2024 Last regular class meeting

Assignment Deadlines

Quiz 1 Friday, June 14

Homework 1 Tuesday, June 18

Quiz 2 Friday, June 21

Homework 2 Tuesday, June 25

Exam 1 Friday, June 28

Homework 3 Tuesday, July 2

Quiz 3 Friday, July 5



Homework 4 Tuesday, July 9

Quiz 4 Friday, July 12

Homework 5 Tuesday, July 16

Exam 2 Friday, July 19

Homework 6 Tuesday, July 23

Quiz 5 Friday, July 26

Homework 7 Tuesday, July 30

Exam 3 Friday, August 2

4 Written Homework

Writing is a significant part of doing mathematics, and the best way to show you understand a concept. To this end, a large part of your grade will rely on *written homework*. I encourage you to work with your peers, but *you must personally write all solutions in your own words!* **Any evidence of the use of AI in writing a proof WILL be investigated as Academic Dishonesty.** Remember, a computer is only as smart as what it is fed, and it is notoriously bad at generating proofs. I want *you* to develop mathematical reasoning and language, not AI. Asking AI questions is developing someone else's technology for free, and you (or someone else on your behalf) have already paid for this course, so it is ultimately only cheating yourself. We will have time to work on written homework in class, and I am more than happy to help you!

4.1 Submission and Late Policy:

You **MUST** submit written homework in person. Solutions must be neat, legible, and well crafted. I do not accept late assignments (except in the event of a university approved absence/accommodation).

5 Vocabulary Quizzes

The purpose of vocabulary quizzes in this course to help you memorize and internalize rigorous definitions and theorem statements so that when you write proofs, you have a greater understanding of the objects at hand. Any theorem, proposition, lemma, remark, or definition in the weekly reading assignments could possibly show up on a vocabulary quiz. Vocabulary quizzes can only be completed in class.

6 Exams

There will be two midterm exams and a noncumulative final. Each exam will be one hour during class. Exam 1 is scheduled for **Friday, June 28th**, Exam 2 is scheduled for **Friday,**

**July 17th, and Exam 3 is Friday, August 2nd.**

Make-up exams will only be available in the event of a university approved absence or emergency, with proper documentation from, for example, a medical or legal professional. Please let me know as soon as possible if you anticipate a conflict between an exam and a university-sanctioned event.

7 Policies

The Department of Mathematics has a set of policies which cover topics ranging from cell phones to alternate exams. These are available at

[https://mathematics.colostate.edu/undergraduate-students/
departmental-class-policies/](https://mathematics.colostate.edu/undergraduate-students/departmental-class-policies/)

and it is your responsibility to read them.

Having said that, I call your attention to a few issues in particular.

7.1 Make-up assignments

Make-ups for assignments will be given *only* in the cases of university approved absence and documented emergencies. All excuses must include adequate documentation. Inform me about any such university approved absences as soon as possible, and at least a week in advance.

7.2 Academic Integrity and Honor Code

Colorado State University has an Academic Integrity Policy and Student Conduct Code; you can read about this policy at <http://policylibrary.colostate.edu/policy.aspx?id=442>, and find related materials at <https://learning.colostate.edu/integrity/>. This will be enforced in this course. Briefly, while you are encouraged to seek out help, including from your peers, all work on any submitted assignment must be your own.

From the class policies link above: *By handing in homework, lab reports and exams you certify that this is your own work. You are encouraged to discuss homework solution strategies and laboratory write-ups with fellow students, but the final write-up must be your own. (For example it is fine to get help to find out what method to use on a given problem, but it is not okay to write down the specific details of the method from a sheet someone else wrote. If you are uncertain ask your instructor or explain in your submission to what extent the material handed in is another person's work.) Misrepresenting someone else's work as your own (plagiarism; this includes submitting work from a Solutions Manual or an on-line homework website as your own), possessing or using unauthorized reference information in any form that could be helpful while taking an exam (for example a calculator not explicitly permitted), or doing homework problems*



with the aid of a computer algebra system are examples of cheating. Students judged to have engaged in cheating may be assigned a reduced or failing grade for the assignment or the course and may be referred to the Office of Conflict Resolution & Student Conduct Services for additional disciplinary action.

Students judged to have engaged in cheating on an assignment will receive at least a score of 0 for that assignment. Also, for the student who received a 0 on an assignment due to cheating, Repeat/Repair will not be an option for the grade earned the semester cheating occurred. A second offense will result in an F for the course. Cases of flagrant academic dishonesty will be brought to the attention of the TILT Academic Integrity Program.

7.3 SDC and Accommodations

I, together with Colorado State University, am committed to providing reasonable accommodations for all individuals with disabilities. If you anticipate needing accommodations for this course, especially for quizzes, please contact the ([Student Disability Center](#)) as soon as possible. Accommodations must be made prior to the first quiz.

This section is copied from the CSU syllabus template, which is provided to CSU instructors.

I am committed to the principle of universal learning. This means that our classroom, our virtual spaces, our practices, and our interactions be as inclusive as possible. Mutual respect, civility, and the ability to listen and observe others carefully are crucial to universal learning. If you are a student who will need accommodations in this class, please contact me to discuss your individual needs. Any accommodation must be discussed in a timely manner. A verifying memo from The Student Disability Center may be required before any accommodation is provided. The Student Disability Center (SDC) has the authority to verify and confirm the eligibility of students with disabilities for the majority of accommodations. While some accommodations may be provided by other departments, a student is not automatically eligible for those accommodations unless their disability can be verified and the need for the accommodation confirmed, either through SDC or through acceptable means defined by the particular department. Faculty and staff may consult with the SDC staff whenever there is doubt as to the appropriateness of an accommodation request by a student with a disability. The goal of SDC is to normalize disability as part of the culture of diversity at Colorado State University. The characteristic of having a disability simply provides the basis of the support that is available to students. The goal is to ensure students with disabilities have the opportunity to be as successful as they have the capability to be. Support and services are offered to student with functional limitations due to visual, hearing, learning, or mobility disabilities as well as to students who have specific physical or mental health conditions due to epilepsy, diabetes, asthma, AIDS, psychiatric diagnoses, etc. Students who are temporarily disabled are also eligible for support and assistance. Any student who is enrolled at CSU, and who self-identifies with SDC as having a disability, is eligible for support from SDC. Specific



accommodations are determined individually for each student and must be supported by appropriate documentation and/or evaluation of needs consistent with a particular type of disability. SDC reserves the right to ask for any appropriate documentation of disability in order to determine a student's eligibility for accommodations as well as in support for specific accommodation requests. The accommodation process begins once a student meets with an accommodations specialist in the SDC.

8 Course Outline

Here is a rough overview of the topics we will cover in this course. *Topics and pacing are subject to change at the instructor's discretion.*

Unit 1: June 10 - June 28

- Chapter 1: Introduction
 - Section 1: The natural numbers
 - Section 2: The rational numbers
 - Section 3: The real numbers
 - Section 4: Axiom of completeness
 - Section 5: Understanding $+\infty$ and $-\infty$
- Chapter 2: Sequences
 - Section 7: Limits of sequences
 - Section 8: Proofs
 - Section 9: Limit theorems for sequences
 - Section 10: Monotonic and Cauchy sequences
 - Section 11: Subsequences
 - Section 12: Supremum and Infimum
 - Section 14: Series
 - Section 15: Convergence tests

Unit 2: July 1 - July 19

- Chapter 3: Continuity
 - Section 17: Continuous functions
 - Section 18: Properties of continuity
 - Section 19: Uniform continuity
 - Section 20: Limits of functions
- Chapter 4: Sequences and Series of Functions
 - Section 23: Power series
 - Section 24 & 25: Uniform convergence
 - Section 26: Differentiation and integration of power series



Unit 3: July 22 - August 2

- Chapter 5: Differentiation
 - Section 28: Properties of the derivative
 - Section 29: Mean value theorem
 - Section 30: L'Hopital's rule
 - Section 31: Taylor's theorem
- Chapter 6: Integration
 - Section 32: The Riemann integral
 - Section 33: Properties of the Riemann integral
 - Section 34: Fundamental theorem of calculus