Math 317 - Advanced Calculus of One Variable - Fall 2023
Monday, Wednesday & Friday 1-1:50pm in Military Sciences 105

Instructor:	Dr. Liz Arnold
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Office Hours:	TBD

Course Materials:

- **Selected Readings & Class Activities:** These will be posted in Canvas and handed out in class, as needed.

- **Miscellaneous:** Pencils, pens, colored pencils, graph paper and a binder or notebook of some type.

- **Textbook:** *Elementary Analysis: The Theory of Calculus* by Kenneth A. Ross. To download a free pdf version of this book, click the link provided in Canvas from an on campus computer or while connected to the CSU network.

Course Description and Goals:

An introduction to topics in real analysis; topics will include convergence of sequences, series, limits, continuity, differentiation, and integration of one-variable functions. *Prerequisite: (Math 156 or 161) and (CS 220 or Math 230 or Math 235)*

In particular, we will make sense of the following through **analyzing and constructing proofs**:

- What are the real numbers?
- What is the limit of an infinite sequence? How can we make sense of infinite series?
- What is the structure of the space of real numbers and how can we use that structure to understand functions?
- What does it mean for a function to be continuous? What properties do continuous functions have?
- What is a derivative? What is an integral? What is the relationship between them?

Math 317 is designed to strengthen your understanding of these mathematical concepts (which you were introduced to in a typical calculus course like Math 160/161). A large part of this course is exploring one's own thinking about mathematics and acknowledging that others may think about mathematics in ways that are fundamentally different and valuable. In order to fully understand and appreciate these ways of thinking, we must move beyond the how of mathematics, often captured in cryptic mathematical procedures, and consider the underlying mathematical concepts that explain the **why** of mathematics. Throughout this course, we will engage in mathematical processes that encourage you to:

- Make sense of problems and persevere in solving them;
- Reason abstractly (representing quantities symbolically and manipulating those symbolic representations) and quantitatively (attending to the meaning of quantities and operations rather than computations alone);
- Use appropriate tools (e.g., diagrams, manipulatives, and models) strategically to solve mathematical problems;
- Develop and extend your mathematical understanding through active communication (e.g., reading, writing, speaking, and listening) of mathematics, attending to precision of mathematical language; and
- Construct viable mathematical arguments and critique the reasoning of others.

Course Mission:
There are two main objectives for this course. The first objective is to challenge you, as a student in an upper-level mathematics course, to think deeper about mathematics and to extend your mathematical understanding. The second objective is to connect the content of this course to content you have previously learned and to content you will learn in future courses. Challenging and connecting (in a collaborative learning environment) will be the driving force of all class work.

Course Components and Grading:
I expect you to attend class, come prepared, actively participate in class, and complete assignments on time. If you are absent from class it is your responsibility to get notes and information from other students.

1. **Assignments – 30%.** Various assignments (such as problem sets, readings, activities, quizzes, discussions, etc.) will be assigned regularly throughout the semester.

2. **Exams – 40%.** Two exams (each 20%) will be given throughout the semester. Exam 1 is tentatively scheduled for Monday, October 2 and Exam 2 is tentatively scheduled for Monday, November 13.

3. **Final Exam – 30%.** A cumulative final exam is scheduled for Friday, December 15 from 7:30–9:30am. Plan your end-of-the-semester travels around this date.

Letter grades will be assigned according to the following scale:

A: 90–100%   B: 80–89.9%   C: 70–79.9%   D: 60–69.9%   F: Below 60%

Plus and minus grades within these ranges will be assigned at my discretion and assigned at the end of the semester. Plus and minus decisions are typically based on attendance, class participation and the natural breaks in the class's distribution of scores. Your course grade will be based on your performance on the course components. If you are not performing at the level that you want/need to perform, seek help early to improve your study strategies and understanding of the course material. Note that I will not respond to email requests for extra credit, extra points, or special treatment.

Canvas:
I will be using Canvas (`https://canvas.colostate.edu`) to post announcements, grades, and

all course materials. I will regularly update the class schedule in Canvas to keep track of what we have covered or will cover. You are expected to check Canvas on a daily basis.

LEARNING ENVIRONMENT:
I value diversity, social justice, inclusion and equity in this (and every) class. I hold the fundamental belief that everyone is fully capable of engaging in and mastering the course content. There is more than one way to approach a problem, and our learning will be richer by remaining open to different ideas, by rejecting stereotypes, and being aware of stereotypes in order to minimize our biases. It is expected that everyone involved in this class, instructor and students alike, will act in a manner conducive to providing a comfortable environment for learning, a place where students feel free to ask and answer questions without fear of embarrassment or ridicule. If you have any personal difficulties with the learning environment in this course, please email me to discuss them. I look forward to getting to know you all, as individuals and as a learning community!

CLASS EXPECTATIONS:
Class sessions will involve a variety of formats, including problem solving, class activities, discussion, and lecture. **Learning** mathematics means **doing** mathematics. In this course, we will jump right into doing mathematics through solving problems, reasoning about mathematical arguments and proofs, communicating mathematics to others, and representing mathematical ideas in more than one way. You will work individually, in pairs, in groups, and as a whole class, and you are expected to **actively participate** in class. Your level of participation, including the questions you ask and interactions with others in the class, will affect the quality and quantity of your learning as well as the learning of others in the classroom. Sharing your solutions, undeveloped ideas, and puzzlements with the class, as well as responding to classmates' ideas, statements, and questions are all critical to our work together.

For these reasons, I expect you to conduct yourself professionally in class. The norms for classroom conduct are guided by the principle that you are in class to participate in a community of mathematical learners, with the course content as our focus. You should evidence this by:

- Attending all class meetings (with the understanding that you are healthy);
- Arriving on time with the materials needed for class;
- Preparing for class by completing assignments in advance and on time and being ready to discuss them;
- Actively engaging in all tasks and activities and working in a thoughtful manner;
- Listening carefully and respectfully to others; and
- Frequently contributing to small group and whole class discussions in a respectful way by making comments that link to others' ideas, sharing your own ideas, thoughts, and puzzlements, and asking questions of the instructor and fellow students.

Tips for Success:
- Actively participate in class! Your learning, and the course itself, will be shaped through your participation which includes asking questions of me and of other people in the class and sharing your ideas.
- Ask questions when you need help or clarification.
- Start working on assignments as they are assigned. Don't wait until right before the due date to start.
- Be prepared to think differently and to spend time outside of class working through challenging and exciting aspects of the course. Genuine problem solving and learning take time.
- Come to my office hours (or make an appointment) to ask questions, to get help with problems you are struggling with, to get feedback on your solutions and explanations, and to get clarification on assignments. Sooner than later is always better and I'm happy to help!
- Form study groups. Consistently thinking about and discussing the ideas we address in class with your peers is paramount to your success.
- Start engaging from the beginning of the semester!

Disability Accommodations:
If you need an accommodation based on the impact of a disability, you should contact the Student Disability Center (TILT, Room 121, `https://disabilitycenter.colostate.edu`, 970-491-6385) if you have not previously done so. The Disability Center will provide you with an accommodation letter that will verify your need for services. Please bring me this letter as soon as possible.

Academic Honesty & Integrity:
Academic misconduct will not be tolerated in any form. Students are responsible for adhering to the Academic Integrity Policy of the Colorado State University General Catalog and the Student Conduct Code. See `https://resolutioncenter.colostate.edu/wp-content/uploads/sites/32/2018/08/Student-Conduct-Code-v2018.pdf` for more information. At a minimum, violations will result in a grading penalty in this course and a report to the Office of Student Resolution Center.

- Collaboration – You are expected to collaborate with your classmates, but all work turned in must be your own. You must not copy solutions from others or use solutions that are not your own (e.g., from ChatGPT, Chegg, etc.). If you are unsure about the degree of collaboration that is acceptable, please ask me for clarification.

- Cheating – Cheating includes using unauthorized sources of information and providing or receiving unauthorized assistance on any form of academic work or engaging in any behavior specifically prohibited by the instructor.

- Plagiarism – Paraphrasing or quoting another's work without citing the source is a form of academic misconduct. Even inadvertent or unintentional misuse or appropriation of another's work (such as relying heavily on source material that is not expressly acknowledged) is considered plagiarism. If you have any questions about using and citing sources,

you are expected to ask for clarification.

Above all, a college education is a huge individual accomplishment, and you should be proud of this accomplishment, knowing that you approached this time in your life with honesty and integrity.

DISRUPTIVE BEHAVIOR:
Disruptive conduct disrupts the process of teaching and learning, and such behavior will not be tolerated in the classroom, online, or any other place of student learning. Disruptive behavior is inappropriate student behavior that an instructor would view as interfering with the ability of instructors to teach and students to learn. It may constitute a violation of law, a violation of the student conduct code, a violation of a CSU policy or a violation of an instructor's established norms of conduct for a particular class.

ADDITIONAL POLICIES & RESOURCES:
Visit `https://col.st/2FA2g` to access additional policies relevant to your courses and resources to help you with various challenges you may encounter.

This syllabus is subject to change, and I reserve the right to make adjustments to the syllabus as needed. Last updated on August 20, 2023.