

# Calculus III, Spring 2024

## MATH 253 - 002 CRN 43682



**Meeting:** Mon – Thur, 12-12:50pm in Wubben Science 113

### Dr. Eric Miles

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**Office hours:** MTWRF 10-10:50am (**no appointment necessary**)

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*Calculus III is a beautiful exploration of how the fundamentals of Calculus play out in higher dimensions. I'm excited to have you on our team of explorers! -Dr. Miles*

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**Prerequisites:** Calculus II

**Time commitment:** 8 hours of work outside class per week

**In class:** Lecture/practice/group work

**Daily homework:** WebAssign (online system)

**Weekly homework:** Written homework

**Exams:** 3 Midterms, 1 cumulative Final

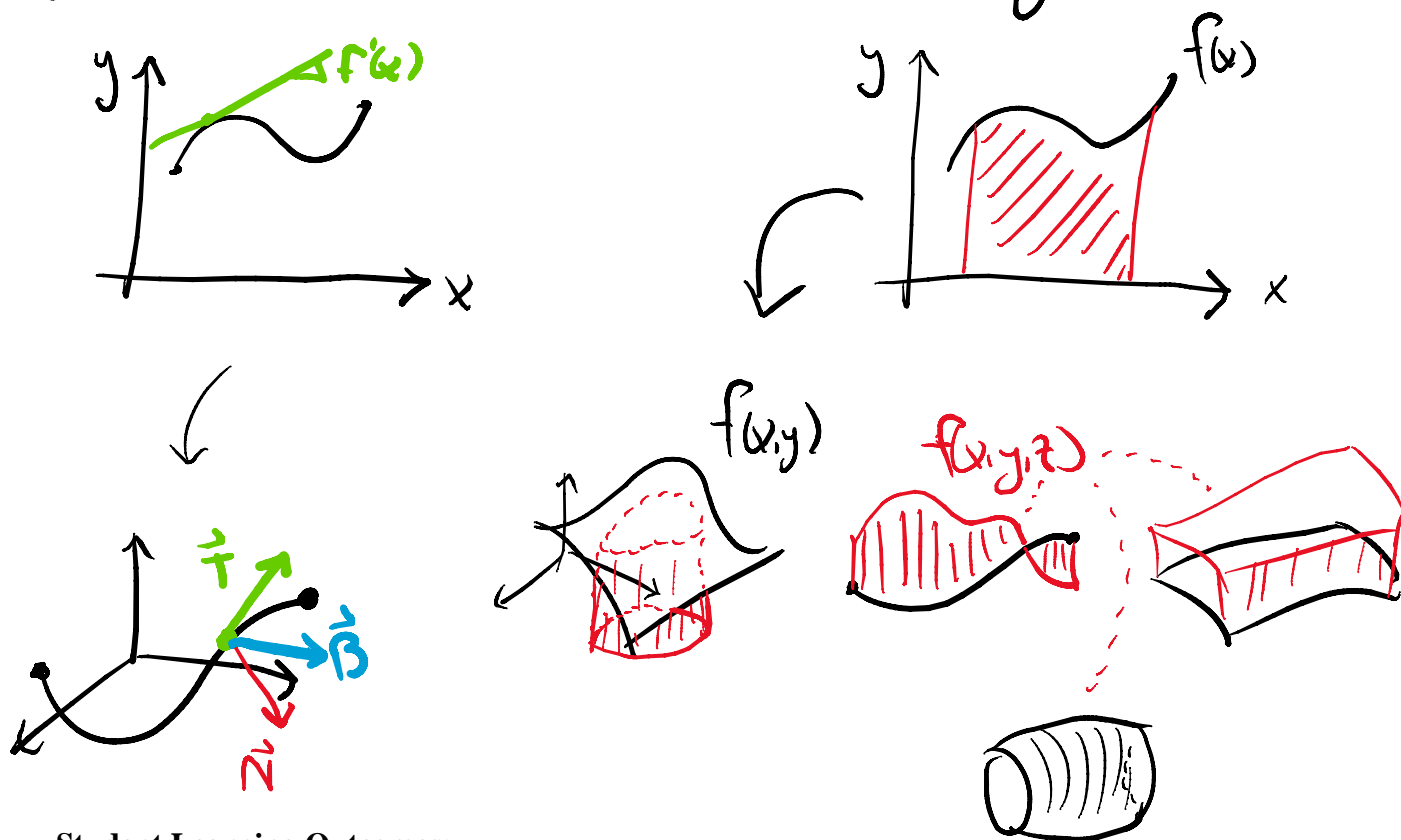
**Prerequisite:** A grade of C or better in Math 152 or equivalent (Calculus II). If you do not meet this prerequisite, come see me!

### Required Material:

- **Text:** *Calculus, 9<sup>th</sup> ed* by Stewart, bundled with access to WebAssign
  - WebAssign only [contains ebook], *or...*
  - Loose-leaf bundled with Webassign (from Bookstore), *or...*
  - Cengage Unlimited (can then purchase physical text if you want)
- **Calculator:** A scientific calculator is required for this course and a graphing calculator such as the TI-83 or TI-84 is strongly recommended. (I will typically use a TI-84 for in-class demonstrations.) A TI-89, TI-92 or a TI Inspire (i.e. those that can perform symbolic manipulation) are not permitted on exams, and cell phones may not be used during exams.
- **WebAssign:** <http://www.webassign.com>
  - Create an account (if you don't already have one)
  - Course key: **coloradomesa 3892 7217**
  - Please use your official name as listed on the roster
  - You are automatically granted access for a two week grace period that expires the 14<sup>th</sup> day after class starts. After the 14<sup>th</sup> day you will need an access code.

**Course Content:** Introduction to multivariable calculus. Topics include three-dimensional space, vectors, functions of several variables, partial derivatives, directional derivatives, multiple integrals, vector fields, and the integral theorems of vector calculus. In other words...

Q: How does Calculus work in higher dimensions?



**Student Learning Outcomes:**

Upon satisfactory completion of MATH 253: Calculus III, students should be able to:

- Describe lines, planes, and space curves analytically in the 3D coordinate system.
- Evaluate and interpret the geometric meaning behind partial derivatives, directional derivatives, and gradients of functions of several variables.
- Determine maxima and minima of scalar-valued functions.
- Set up and evaluate multiple integrals of scalar-valued functions in 2 and 3 dimensions, in rectangular, polar, cylindrical, and spherical coordinates.
- Integrate functions of several variables by a variety of methods, including change of variable and changing the order of integration.
- Set up and evaluate line integrals and surface integrals, and interpret them in terms of applications, such as work or flux.
- Evaluate integrals using Green's, Stokes', and the Divergence Theorem.
- Communicate mathematical ideas and solutions to problems using correct mathematical notation and terminology.
- Communicate mathematical analysis symbolically, graphically, and in written language that clarifies/justifies/summarizes reasoning.

**Class Periods:** Classes will involve a mixture of lecture, practice, and working in groups. I will often ask the class questions and you should always feel free to ask questions throughout the class period. *To get the most out of class, you should read and try to understand the main point(s) of the section to be covered before class.*

**Participation:** Each student in this class has chosen to be part of this community of learners, and continuing in this class carries an obligation to contribute to and respect our community (both in-person and online). This looks like coming to class a few minutes early, being prepared for class, asking questions, participating in discussions and activities, and seeking help outside of class when appropriate. Distracting or negative behavior (e.g. using your cell phone during class, consistently coming late, unprofessional communication) disrupts our learning environment and may hurt your grade. (Students who persist in inappropriate behavior may be administratively dropped from the class.) If you come to class and participate in a positive, constructive, focused way, you'll be all set here.

**Online Homework:** To give us a chance to practice with class concepts and computational techniques, we use online homework through Webassign. You will receive instant feedback on whether or not your answers are correct, and *you can retry problems as many times as you like (in general) with no loss of credit.* Homework assignments will be due at 11:59pm on Thursdays and Sundays. For these assignments to help your understanding as much as possible, *you should be working on a homework assignment each day.* It is possible to complete homework assignments after the due date, but late problems will have a 30% point reduction.

**Written Homework:** Whereas WebAssign is designed to give you computational practice and the system only cares about your final answer, written homework problems will be graded not just on correctness, but on presentation and clarity. **Math is as much about communicating your process as it is about getting the correct answer**, therefore answers without supporting work will generally earn no credit, and partial credit will be given at the instructor's discretion.

Written homework assignments will be given approximately weekly. To get as much learning out of the homework as possible, *these problems should be started as soon as possible after they are assigned.* **Come to office hours for help, hints, or feedback on your solution write-up.** If you will be unable to turn in a homework the day it is due, it is your responsibility to turn it in early. Due dates will be announced with each assignment and your lowest score will be dropped.

**On Collaboration:** (*guiding principle: "Work together, write up separately."*)

**I encourage you to work with your classmates on the homework (and to come seek my help at office hours!), but no collaboration is allowed in writing your solutions.** In practice, what this means is that if working with others, you should first talk and use scratch paper to figure out the problem at hand – then go your separate ways and write up your solution entirely on your own. This way you can be sure that you understand and have internalized the problem and the concepts surrounding it. Copying homework solutions directly from someone else or from the internet is academic dishonesty (plagiarism) and will be treated as such. From the university's code of integrity: **By submitting work which is not your own, you may forfeit the opportunity to continue as a student.**

**Midterm Tests:** We will have 3 midterm tests, occurring approximately every fourth week. Just as with the weekly homework, answers without supporting work will generally earn no credit, and partial credit will be given at the instructor's discretion. *No notecards or notes will be allowed on any quiz or exam.* If your final exam score is better than your lowest midterm score, then your final exam score will **replace** your lowest exam score. With this provision in mind, make-up exams will not normally be given.

**Final Exam:** The final exam is on *Mon., May 13, 1-2:50pm.* This will be a cumulative exam. The exam takes place in our regular classroom. Do not make plans to leave campus before this date; you *have* to take the final at this date and time.

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<b>Grade Computation:</b>	<b>Weekly Homework</b>	15%
	<b>Online Homework</b>	9%
	<b>Participation</b>	4%
	<b>Midterms</b>	50%
	<b>Final Exam</b>	22%

The following percentages of the maximum semester score determine your grade: 90% earns an A, 80% earns a B, 70% earns a C, and 60% earns a D.

**Attendance:** I value your attendance and contribution very much. It is incredibly important for the atmosphere of collaborative learning we look to create, and is essential for your understanding of the class material - *so come to class every day!* Attendance also directly affects your Participation score: you have 2 “free” absences, then after 2 more, your maximum Participation score is 90%, and each additional *unexcused* absence lowers your maximum Participation grade by 10% (e.g. after 5 absences, max = 80%). Any student having with 8 *unexcused* absences may be dropped by the instructor without notice to the student. Please do not come to class if you are ill. Accommodations will be made for students absent for COVID-related reasons – in this situation, please email me as soon as possible.

**Alternate Exams:** Alternate times for midterms will only be given for a documented medical reason or participation in an inter-collegiate activity. Work, travel, vacation, or any other non-college sanctioned activity is not an acceptable excuse for missing an exam. Exceptions to this rule are rare and given only in extreme circumstances as judged by me.

If you are going to miss a test (for one of the two reasons stated above), *it is your responsibility to notify me at least one week in advance.* After this deadline, I cannot guarantee an alternate time. Note that no makeup exams will be given after they have been returned to students.

**Credit Hours Policy:** An undergraduate student should expect to spend on this course a *minimum of two hours outside of the classroom for every hour in the classroom.* We will be covering challenging material at a fast pace, so time spent reviewing/summarizing lecture notes, working homework, reading ahead, and coming to office hours is essential.

**Tutoring:** CMU offers **FREE** *walk-in tutoring* at the Tutorial Learning Center, located in Houston 113. Do you have a quick question? Do you need homework clarification or feedback on a paper? Are you reviewing for a test? Help is available at the TLC! See their website for schedules and locations: [www.coloradomesa.edu/tutoring](http://www.coloradomesa.edu/tutoring) or call at 248-1392 with any questions.

**Academic Honesty:** Cheating is unacceptable on this campus. Students caught cheating may be removed from the class and given an F for the course. Again, from the university's code of integrity: By submitting work which is not your own, you may forfeit the opportunity to continue as a student.

**EAS:** In coordination with Educational Access Services, reasonable accommodations will be provided for qualified students with disabilities. Students should contact Educational Access Services at 970-248-1856 or Houston Hall, Suite 108 as soon as possible.

**Citizenship:** To keep the classroom environment as amenable to learning as possible, students agree to behave as mature, respectful adults. Be considerate of others and help the class focus. In particular...

- Using your cell phone distracts you and those around you, *so keep phones stored away during class.*
  - A few friendly reminders may be granted early in the semester, but for persistent violators each observed unapproved instance of a cell phone or technology violation will result in a 1 point deduction from their final exam score.
- Come to class on time. If you need to come late or leave early, that's fine – but don't make it a habit.
- Any guests must be authorized beforehand by the instructor.
- Do let me know if you have a question, if you didn't see what happened at a certain step, or didn't catch why we did something, or if you have no idea what just happened.
- Do offer any insights you have as to alternative ways of solving problems, connections with other lines of thought, etc.
- Do speak **LOUDY** and positively during group work (*no whispering!*) and collaborate with your group members, working together and asking and answering questions.
- Do let me know if my writing is illegible, if I need speak up, or if you don't want me to erase something from the board yet.

Please read the student code of conduct in your student handbook or online:  
<http://www.coloradomesa.edu/student-services/maverick-guide.html>

The *Tentative Schedule* below contains our class plan, as well as drop/withdraw deadlines:

<b>Math 253 Spring 2024</b>	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Fri</b>
22-Jan	Introduction and Overview	12.1 3D Coords	12.2 Vectors	12.3 Dot product	
29-Jan	12.4 Cross product	12.5 Equations of lines and planes	12.5	12.6 Cylinders and quadric surfaces	
5-Feb	13.1 Vector fcn's and space curves	13.2 Calculus of vtr-valued functions <b>(last day to Drop)</b>	13.3 Arc length and TNB frame	13.3 / 13.4	
12-Feb	13.4 Motion in space	14.1 Fcn's of several variables	14.2 Limits and continuity	Review	
19-Feb	TEST 1	14.3 Partial derivatives	14.3 / 14.5	14.5 Chain rule	
26-Feb	14.6 Direc. Deriv. and Gradient	14.4,6 Tangent spaces	14.7 Max's and min's	14.7	
4-Mar	14.7 / 15.1 Dbl integrals: rectangles	15.1 / 15.2 Iterated integrals	15.2 / 15.3	15.3 Dbl integrals: general regions	
11-Mar	15.4 Dbl integrals: Polar coords	15.4 / 15.6 Surface area	15.6	Catch-up	
18-Mar	Spring Break				
25-Mar	Review	TEST 2	15.7 Triple integrals	15.7	
1-Apr	15.8 Trip integrals: cylindrical coords	15.9 Trip integrals: spherical coords	15.8 / 15.9	15.10 Change of vars	
8-Apr	15.10. <b>(last day to Withdraw)</b>	16.1,2 Line integrals	16.1,2 Projected Line Integrals	16.1,2 Line integrals of vector fields	
15-Apr	16.3 Fund Thm of Line Integrals	16.3	Catch-up	Review	
22-Apr	TEST 3	16.4 Green's Thm	16.4	16.5 Curl and divergence	
29-Apr	16.6 Parametric surfaces	16.7 Surface integrals	16.7	16.8 Stokes' Thm	
6-May	16.8	16.9 Div Thm	Review	Review	
13-May	FINAL EXAM 1-2:50 pm				

The above schedule may be changed at the discretion of the instructor.

Calc III Questionnaire Assignment – Fill out and turn in the 2<sup>nd</sup> day of class

**A. Syllabus Confirmation**

I have read and understood the syllabus for this course.

\_\_\_\_\_

Signature

\_\_\_\_\_

Date

**B. Background Information**

Name (Print Clearly)	
How Your Name is Pronounced	
Year in College	

Fill in the following table with all previous and current math/stat/related college-level courses.

	Course Name	When (Semester/Year)
1		
2		
3		
4		
5		
6		

What is your intended major? \_\_\_\_\_

Why are you taking this course? \_\_\_\_\_

Do you plan to take any further math courses? \_\_\_\_\_

What is your hometown? \_\_\_\_\_

What's something interesting about you?

Other (Please comment below on any other information that you would like me to be aware of.)