

California Baptist University

Department of Natural Sciences & Mathematics

MATH 343 – Multivariable Calculus

Fall 2025

Instructor and Course Information

Instructor: Dr. Michael Sill

Office: James 473

E-Mail: msill@calbaptist.edu

Office Hours: See Blackboard for location and times

Textbook

Calculus, 12th edition, by R. Larson and B. Edwards

Purpose of this Course

Welcome to the world of 3-dimensional mathematics!

The purpose of this course is to provide foundational knowledge applicable to various fields, including mathematics, physics, chemistry, engineering, biochemistry, and economics, among others.

One-dimensional calculus introduces essential concepts, such as “rates of change” with derivatives and “net quantities” with integrals (e.g., $\text{work} = \int \text{Force} \cdot ds$). However, single-variable functions are insufficient for modeling complex physical systems, like a melting ice cube, where heat radiates in all three spatial directions. This course will develop critical ideas necessary for solving real-world problems, as outlined in the course description below.

Course Description

We will cover five chapters in this course, starting with Chapter 11 and ending with Chapter 15. The material can be roughly divided into three categories:

Geometry of Multivariable Maps:

- Definition of vectors and vector operations, with significant geometric representations.
- Definition of paths and surfaces.
- Definition of a vector field.

Differential Calculus:

- Limits

- Partial derivatives and directional derivatives
- Optimization

Integral Calculus:

- Double and triple integrals of scalar-valued functions
- Line and surface integrals of vector-valued functions
- Green's, Stokes', and Gauss' integral formulas (if time)

Hybrid Structure

This course is hybrid. Each Thursday by noon, lecture videos will be released on Blackboard. These videos provide essential lecture content, which must be watched before attending Friday's in-person lecture.

Grading Policy and Evaluation Criteria

Your progress will be measured through homework assignments, three exams, and a comprehensive final exam.

Homework

Homework is managed via WebAssign. Use the class key below to enroll:

- Class Key: **calbaptist 6978 5231**

Assignments and due dates will be posted under the "My Assignments" tab in WebAssign. Completing and understanding the homework is crucial for success.

- Homework counts for 15% of your course grade.

Exams

There will be three exams and a comprehensive final exam:

- Exam 1: Covers Chapters 11 and 12, roughly.
- Exam 2: Covers Chapter 13 and the first few sections of Chapter 14.
- Exam 3: Covers the second half of Chapter 14 and the first four sections of Chapter 15.
- Final Exam: Comprehensive.

See the course schedule below for more details.

- Each midterm exam counts for 20% of your course grade.
- The comprehensive final exam counts for 25% of your course grade.

Final Exam Time: Wednesday, December 10, 2025 from 9:30 – 11:30 am.

Grading Scale

A: 93% - 100%

A-: 89.5% - 92.9%

B+: 87.5% - 89.4%
B: 82.5% - 87.4%
B-: 79.5% - 82.4%
C+: 77.5% - 79.4%
C: 72.5% - 77.4%
C-: 69.5% - 72.4%
D+: 67.5% - 69.4%
D: 62.5% - 67.4%
D-: 59.5% - 62.4%
F: Below 59.5%

Additional Grading Policies

Students missing an exam due to a university-related activity or a documented medical reason must notify the instructor beforehand and will make up the exam at the Academic Resource Center. For missed exams without prior notification, a make-up exam will only be allowed for verifiable, documented emergencies.

- Students with a class grade of 93% or higher going into finals week will be excused from the final exam.
- If a student scores 90% or higher on the final exam, their lowest exam grade will be replaced by an average: $(\text{lowest exam \%} + \text{final exam \%})/2$.

Faith Theme

The Unreasonable Effectiveness of Mathematics in the Natural Sciences

We will explore Eugene Wigner's paper on this topic and discuss its implications for faith, theology, and philosophy.

Academic Honesty

Any incidents of academic dishonesty (e.g., cheating, copying) must be reported to the Student Services Office. The first incident is handled at the professor's discretion, in consultation with the Dean of Students. Penalties may include, but are not limited to, failure of the assignment/exam, a loss of letter grade, failure in the course, suspension, or expulsion from the University. Refer to the CBU student handbook for more information.

Course Support and Disability Services

The Office of Student Success (OSS) provides resources to help students succeed, including:

- Tutoring and Testing (available upstairs)
- Disability Services
- Graduation and Retention
- Academic Mentoring
- Grade Checks
- Academic Appeals
- Study Abroad

- Alpha Chi Honor Society

The OSS offers free one-on-one or group tutoring in multiple subjects, workshops on academic strategies, and disability accommodations (e.g., note takers, readers, sign language interpreters, private testing environment, extended testing time). The OSS is located in Lancer Arms.

Classroom Etiquette

Please be respectful to both the instructor and other students during class. Engage actively in lectures and take notes. All electronic devices (laptops, cell phones) should be turned off during class, as they can be distracting and hinder your performance.

AI Guidelines

Artificial Intelligence (AI) tools (e.g., ChatGPT) can be helpful for studying when used thoughtfully and ethically. In MATH 255, AI must support your learning—not replace the thinking and practice you need to master Calculus II.

- Homework policy (strong warning): Do not use AI to complete or generate your homework solutions. Homework is for practice and skill-building; outsourcing steps to AI undermines learning and will hurt your performance on quizzes and exams.
- Permitted study uses: You may consult AI for concept explanations, strategy hints, or to check your own steps as you review lecture notes or prepare for quizzes and exams.
- Quizzes & exams: AI tools and internet-based problem solvers are not permitted on any quiz or exam. Show your work and be prepared to explain your reasoning.
- Confidentiality: Do not enter personal information, grades, or non-public CBU data into AI tools.
- Responsibility & accuracy: AI can be incorrect or fabricate sources. You are responsible for verifying any AI-assisted ideas and ensuring the submitted work is genuinely your own.
- Academic integrity: Submitting AI-generated work as your own violates CBU's Honor Code and will be treated as academic dishonesty.
- Cybersecurity: Be alert for AI-enabled phishing. Report suspicious emails to the CBU ITS Helpdesk (helpdesk@calbaptist.edu, 951-343-4444).

Bottom line: AI may help you study, but it cannot replace your own effort and practice. Use it carefully, ethically, and only within these guidelines.

Lecture Schedule (Tentative)

Week	Dates	Topics / Notes
1	Sept 2–5	Ch 11: Introduction and Vectors (11.1–11.2)
2	Sept 8–12	Vector Operations: Dot and Cross Product (11.3–11.4); Parametric Lines (11.5)
3	Sept 15–19	Planes (11.5); Introduction to Vector-Valued Functions (12.1); Start of Calculus of VV-Functions (12.2)
4	Sept 22–26	Ch 12: Trajectories, Calculus of Vector-Valued Functions ctd. (12.1–12.4); Friday, Sept 26th : Exam 1
5	Sept 29–Oct 3	Ch 13: Multivariable Functions; Partial derivatives; Gradient (13.6)
6	Oct 6–10	Chain Rule, Directional Derivatives; Applications (13.5, 13.6, 13.7)
7	Oct 13–17	Optimization (13.8); Chap 14: Iterated Integrals (14.1)
8	Oct 20–24	Double Integrals (14.2); Polar Coordinates (14.3); Basic (Euclidean) Triple Integrals (14.6)
9	Oct 27–31	Monday, Oct 27th Exam 2; Coordinate Changes for Triple Integrals (14.7, 14.8)
10	Nov 3–7	Conservative fields & potential functions (15.1)
11	Nov 10–14	Line Integrals (15.2, 15.3)
12	Nov 17–21	Fundamental Theorem of Line Integration; Green's Theorem (15.3, 15.4)
13	Nov 24–28	Thanksgiving Break — No Class
14	Dec 1–3	Monday Dec. 1st Exam 3; Review
Finals	Dec 4–10	Wednesday, December 10, 2025, 9:30–11:30 am (Comprehensive).