

Calculus 3 (Math 221, Section 1) Spring 2024

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1 Basic Information

Classes meet.

- Monday, Wednesday and Friday from 2 to 2:50 pm in MYBK 223, and
- Thursday from 1:40 to 2:55pm in MYBK 108.

Textbooks. All course materials are free, available as both websites and PDF, and with the option of buying inexpensive paperback versions.

- The primary source is [Calculus, Volume 3](#)¹ from [OpenStax](#)².
- I also provide a study guide based on my in-class presentations, with further examples, recommended exercises, homework assignments and so on; that will be available on the website <https://lemesurierb.people.cofc.edu/math221-notes/>³ and as a PDF file at <https://lemesurierb.people.cofc.edu/math221-notes.pdf>⁴, and will be in [OAKS](#)⁵.

Professor's Office Hours. To see me out of class, there are two options:

- After any class
- by appointment: arrange by email or by talking with me in-class.

Professor's Office. Room 344, Robert S. Small Building.

Professor's Email Address. lemesurierb@cofc.edu

Professor's Websites. <http://lemesurierb.people.cofc.edu/> and <http://blogs.cofc.edu/lemesurierb/>, but once the course starts, most online communication will be through [OAKS](#)⁶.

Prerequisites. MATH 220.

¹openstax.org/details/books/calculus-volume-3/

²openstax.org

³lemesurierb.people.cofc.edu/math120-notes/

⁴lemesurierb.people.cofc.edu/math120-notes.pdf

⁵lms.cofc.edu/

⁶lms.cofc.edu/

2 Calculating and Graphing Tools

It might be useful to have an ability to do some calculations and draw graphs. The traditional recommendation is a Texas Instruments TI-84 hand-calculator, but I prefer various choices of free "calculating tools" available as websites, phone apps and computer software, and so will demonstrate some of them. One of my favorites is the [Desmos Graphing Calculator](http://www.desmos.com/calculator/)¹; in addition to that website interface, this is available as a free app for [iPhones](#), [iPads](#)², and [Android](#)³ devices.

There are also several other tools at the [Desmos](http://www.desmos.com/)⁴ website, such as a Scientific Calculator.

Such tools may be used for some homework and in-class exercises, but not on tests or the final exam.

3 Course Objectives and Student Learning Outcomes

The main objective of Calculus 3 is to combine ideas of calculus and geometry to deal with functions whose values are a point in the plane or space (a vector), and functions whose arguments are several variables or a vector. These ideas are applied to study curves in space, motion, minimizing functions of several variables and functions defined on surfaces in space, and integrals over solids and surfaces. This material is covered in Chapters 12 to 16 of the text *Calculus: Early Transcendentals* (6th Ed.) by James Stewart, except omitting Section 15.5. Students are expected to prepare for class by doing the reading assignments described below, and to practice what is learnt in class by doing all the recommended homework exercises, not just the ones to be handed in for grading.

By the end of the course, students should be able to:

- Identify, sketch and parametrize surfaces and space curves. Identify and plot vector fields.
- Algebraically manipulate vectors using the dot product, scalar product and cross product to answer geometric questions.
- Apply differentiation and integration to parametrized curves to draw conclusions about the geometry of the curve or about the trajectory of a particle.
- Compute, interpret, and apply various kinds of derivatives of multi-variable functions (whether scalar functions or vector functions).
- Solve multi-variable optimization problems, both constrained and unconstrained.
- Set up, evaluate, and apply integrals over two or three dimensional regions, using various coordinate systems and various orders of integration.
- Convert multiple integrals between different orders of integration and/or different coordinate systems.
- Evaluate and apply line integrals and surface integrals of both scalar functions and vector fields.
- Evaluate integrals by selecting an appropriate version of the Fundamental Theorem of Calculus (FTC for Vector Fields, Green's Theorem, Stokes' Theorem, or the Divergence Theorem) to transform the integral into an easier one with a domain of integration having a different dimension.

These outcomes will be assessed on the final exam.

4 Undergraduate Mathematics Program Student Learning Outcomes

This course can be used to satisfy some requirements of the undergraduate mathematics degree program, for which there are also some standard goals. Students will:

1. Use algebra, geometry, calculus and other track-appropriate sub-disciplines of mathematics to model phenomena in mathematical terms.

¹www.desmos.com/calculator/

²apps.apple.com/us/app/desmos-graphing-calculator/id653517540

³play.google.com/store/apps/details?id=com.desmos.calculator

⁴www.desmos.com

2. Use algebra, geometry, calculus and other track-appropriate sub-disciplines of mathematics to derive correct answers to challenging questions by applying the models from the previous Learning Outcome.
3. Write complete, grammatically and logically correct arguments to prove their conclusions.

These outcomes will be assessed on the final exam.

5 Exercises, Assessment, and Grading

5.1 Homework Exercises for Practice

The study guide will give a list of exercises for each section covered, to help your study. These are not for grading but doing them is an *essential* part of the course; like learning a musical instrument or sport, success in mathematics requires a lot of practice beyond what your instructor sees and grades you on.

5.2 Weekly Quizzes

There will be a short quiz in most weeks; usually on Thursday; the questions will be similar to some of the homework exercises for the sections covered since the previous quiz.

5.3 In-class Exercises

There will be some in-class exercises for extra credit. You are encouraged to work on these in groups and ask me questions, but you should each write up and hand in your own version of the results.

5.4 Mid-semester Tests

There will be three tests, provisionally scheduled for the Thursday classes of *February 1, February 29, and April 4*.

These will be partially cumulative: each will focus on material covered since the previous test, but questions can often rely on ideas and methods learned earlier in the semester. (Math is like that.)

If you miss a test for a good, documented reason, I will have you do the test as homework for practice; then the score can be replaced by your results on the corresponding part of the final exam.

5.5 Final Exam

The final exam will be held *from 3:30 to 5:30 pm on Monday April 29*, as determined by the [College's exam schedule](#)¹. It will cover the whole syllabus, but with more emphasis on topics seen after the last test.

5.6 Grading Scheme

- The combined scores for quizzes and in-class exercises will count for 15% of the course total,
- each test will count for 20%, and
- the final exam will count for the remaining 25%.

However, if the final exam score is better than the lowest test score or the quiz-classwork average, the exam score will carry an additional 10% weight and that low score will count for 10% less.

The aggregate score guarantees at least the following grades:

A	A ⁻	B ⁺	B	B ⁻	C ⁺	C	C ⁻	D ⁺	D	D ⁻
90–100	87–89	84–86	80–83	77–79	74–76	70–73	67–69	64–66	60–63	57–59

¹registrar.cofc.edu/pdf/exam-schedule-spring2024.pdf

6 Participation Requirements

Attendance to all classes is expected, as is active participation in all the work described above. You are responsible for knowing what happens in each class including assignments, information about test topics, and due dates: thus if you miss a class, check for news, either from a classmate or from me; checking the course's section in [OAKS](#)¹ should help.

Absence from a test or more than three quizzes without adequate explanation will lead to failing the course; thus if you miss any of these, contact me promptly to explain why.

7 Accommodations for Students with Disabilities

If you have a documented disability, please contact me during the first two weeks of class or as soon as you have been approved to receive accommodations, so that reasonable accommodations can be arranged. Approval for such accommodations is arranged through the Center for Disability Services: see <http://disabilityservices.cofc.edu/accommodations/>

8 College of Charleston Honor Code and Academic Integrity

Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved.

Cases of suspected academic dishonesty will be reported directly to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XXF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student's transcript for two years after which the student may petition for the XX to be expunged. The F is permanent. The student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

Students should be aware that unauthorized collaboration or working together without permission is a form of cheating. Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information via a cell phone or computer), copying from others' exams, fabricating data, and giving unauthorized assistance.

Students can find the complete Honor Code in this page about the [Honor System](#)¹; see also this page about the [Student Handbook](#)².

¹lms.cofc.edu

¹deanofstudents.cofc.edu/honor-system/

²deanofstudents.cofc.edu/honor-system/studenthandbook/

9 Some Important Dates and Times

Monday January 15	Martin Luther King Day—no classes.
Wednesday January 17	Last day to drop/add courses.
Saturday January 27	Storm make-up day, if needed (classes will be made-up online).
Sunday January 28	Storm make-up day, if needed (classes will be made-up online).
Thursday February 1	Test 1, proposed date.
Saturday February 10	Storm make-up day, if needed (classes will be made-up online).
Thursday February 29	Test 2, proposed date.
March 3 to 9	Spring Break—no classes.
Friday March 22	Last day to withdraw with a grade of “W”.
Thursday April 4	Test 3, proposed date.
Wednesday April 24	Last day of classes.
Thursday April 25	Reading Day.
Monday April 29, 3:30–5:30pm	Final Exam.