

# Calculus 2 (Math 220, Section 3), Spring 2023

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## 1 Basic Information

**Classes meet.** Monday, Wednesday and Friday 12:00–12:50 pm in MYBK 108 and Thursday 12:15–1:30 pm in MYBK 112.

**Text.** The main text is [Calculus, Volume 2](#)<sup>1</sup> from [OpenStax](#)<sup>2</sup>. This is available as a website and also in various other versions as explained there, including a PDF download and apps for iOS and Android. Thus there is no need to buy anything for this course, but if you want, there is a modestly priced printed version, available at the CofC bookstore or via that site.

I will also cross-reference the book *Calculus: Early Transcendentals* by James Stewart, which you might have used in a previous course.

Finally, I will provide a study guide with further examples, recommended exercises, homework assignments and so on; that will be in the [OAKS](#)<sup>3</sup> LMS.

**Professor's Office hours.** To be arranged during the first week of classes; for now I am available immediately after each class and by appointment, either in my office or via Zoom.

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

**Professor's Email Address.** [lemesurierb@cofc.edu](mailto: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.

**Prerequisites.** MATH 120 or HONS 115.

## 2 Course Objectives and Student Learning Outcomes

The main objective of this course is to learn three main topics:

1. *Integration and its Applications.*

Chapters 2, 3 and part of 4.

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<sup>1</sup><https://openstax.org/details/books/calculus-volume-2/>

<sup>2</sup><https://openstax.org>

<sup>3</sup><http://lms.cofc.edu/>

2. *Infinite Sequences and their Sums.*

Chapters 5 and 6.

3. *Geometrical Applications of Calculus.*

Chapter 7.

For example we study computing areas and volumes, lengths of curves, and solving differential equations which describe phenomena like population growth, and describing functions as "infinite polynomials", also called "power series".

I will also emphasize some generally useful mathematical skills:

- Learning correct use of mathematical notation and organization of thinking and written presentations so that it can be understood by peers and instructors.
- Facility and accuracy in basic computational manipulations so that these steps do not get in the way of understanding and solving the main questions at hand.
- Reading, working exercises and developing concise written summaries of important formulas, notation and ideas, to help with study and test preparation.

Students are expected to do not only the graded online assignments and class exercises but also to read each section of the text that is covered in class, and to attempt the exercises set for each section. This is because, more broadly, it is expected that a majority of the learning in this or any College course comes through students' efforts outside the classroom.

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

1. Represent the following as definite integrals: area between curves, volume of a solid of revolution, average value of a function, arc length of a curve.
2. Evaluate integrals by applying integration by parts, trigonometric substitution, trigonometric identities, and partial fraction decomposition.
3. Identify and evaluate improper integrals and apply the comparison test to determine whether an improper integral converges.
4. Identify properties of sequences (monotonicity, boundedness, convergence) and find the limits of sequences.
5. Determine whether an infinite series converges by choosing and applying a suitable convergence test.
6. Determine the radius of convergence of a power series.
7. Use Taylor Series to express functions as power series and to evaluate infinite series.
8. Represent plane curves as parametric equations, and recognize the plane curve that corresponds to given parametric equations.
9. Use derivatives and integrals to find slopes and lengths of parametric curves, and areas bounded by them.
10. Convert between Cartesian and polar coordinates, graph polar curves, and apply calculus to polar curves as for parametric curves.
11. Model mathematical questions with differential equations, and use basic methods for solving such equations.

### **3 General Education Student Learning Outcomes**

This course can be used to satisfy some general education requirements, for which there are some standard goals. Students are expected to display a thorough understanding of the topics covered. In particular, upon completion of the course, students will be able to

1. model phenomena in mathematical terms,
2. solve problems using these models, and

3. demonstrate an understanding of the supporting theory behind the models apart from any particular application.

These outcomes will be assessed on the final exam.

## 4 Calculators

It might be useful to have a graphing calculator, and the standard recommendation is the Texas Instruments TI-84 Plus.

However, many choices of free "calculating device" can work too, including websites, phone apps and computer software, and I will demonstrate some of them. Two of my favorites are the online tools [Desmos Graphing Calculator](https://www.desmos.com/calculator)<sup>1</sup> and the Graphing and 3D calculators at [Geogebra](https://www.geogebra.org/calculator)<sup>2</sup>.

In addition to that website interface, Desmos is available as a free app for [iPhones](#), [iPads](#)<sup>3</sup>, and [Android](#)<sup>4</sup> devices. There are also several other tools at the [Desmos website](#)<sup>5</sup>, such as a [Scientific Calculator](#)<sup>6</sup>.

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

## 5 Graded Work and Grading Scheme

### 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 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.

### 5.3 Weekly Quizzes

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

### 5.4 Mid-term Tests

There will be four mid-term tests, now scheduled for

- Thursday February 9,
- Thursday March 2,
- Thursday March 30, and
- Thursday April 20.

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.)

There are no make-up tests. If you miss a test for a good, documented reason, the score can be replaced by your results on the corresponding part of the final exam.

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<sup>1</sup><https://www.desmos.com/calculator/>

<sup>2</sup><https://www.geogebra.org/calculator>

<sup>3</sup><https://apps.apple.com/us/app/desmos-graphing-calculator/id653517540>

<sup>4</sup><https://play.google.com/store/apps/details?id=com.desmos.calculator>

<sup>5</sup><https://www.desmos.com>

<sup>6</sup><https://www.desmos.com/scientific>

## 5.5 Final Exam

The final exam date and time will be announced later; it will cover the whole syllabus.

## 5.6 Grading Scheme

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

*However*, if the final exam score is better than the lowest test score or the assignment-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 <sup>-</sup>	B <sup>+</sup>	B	B <sup>-</sup>	C <sup>+</sup>	C	C <sup>-</sup>	D <sup>+</sup>	D	D <sup>-</sup>
90–100	87–89	84–86	80–83	77–79	74–76	70–73	67–69	64–66	60–63	57–59

## 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 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 Office Hours, and Additional Help from Tutors in the Math Lab at CSL

I will hold office hours at times to be arranged with the class, as well as being available immediately after classes.

You can also get tutoring help in the Math Lab, located in the Addlestone Library, one of the walk-in labs at the Center for Student Learning: <http://cs1.cofc.edu/labs/math-lab/> There you will find students and some professors who will help you with any specific problems or questions you may have.

## 8 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/>

## 9 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](#)<sup>1</sup>; see also this page about the [Student Handbook](#)<sup>2</sup>.

## 10 Some Important Dates and Times

Wednesday January 11	First day of classes.
Monday January 16	Martin Luther King Day—No classes.
Wednesday January 18	Last day to drop/add courses.
Saturday January 28	Storm make-up day, if needed (classes will be made-up online).
Sunday January 29	Storm make-up day, if needed (classes will be made-up online).
Thursday February 9	Mid-term Test 1.
Saturday February 11	Storm make-up day, if needed (classes will be made-up online).
Thursday March 2	Mid-term Test 2.
March 5–11	Spring Break—no classes.
Friday March 24	Last day to withdraw with a grade of "W".
Thursday March 30	Mid-term Test 3.
Thursday April 20	Mid-term Test 4.
Wednesday April 26	Last day of classes.
Thursday April 27	Reading Day.
TBA	Final Exam.
Tuesday May 9	Grades available on MyPortal.

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<sup>1</sup><https://deanofstudents.cofc.edu/honor-system/>

<sup>2</sup><https://deanofstudents.cofc.edu/honor-system/studenthandbook/>