

# Math 111-01, Fall 2023: Introduction to the Calculus (Intensive)

MWF 10:00 – 10:50am and Tu 10:00 – 11:20am

**Webpage:** <https://rlbenedetto.people.amherst.edu/math111/>

(Also linked from the Math 111-01 moodle page.)

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**Office Hours:** TBA; or by appointment.

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**Supplemental Text:** James Stewart, *Single Variable Calculus*, 8th edition, Cengage Learning 2015.

**Exams:**

- **Midterm 1: Friday, September 29**, in class.
- **Midterm 2: Friday, October 27**, in class.
- **Midterm 3: Friday, December 1**, in class.
- **Final: TBA; it will be three hours, during Finals period**

The only excuses for missing an exam are incapacitating illness, religious conflict, or the like.

**Using calculators, cell phones, etc. during an exam is CHEATING.  
Consulting any outside sources during an exam is CHEATING.  
Copying homework solutions, from any source, is CHEATING.  
All cheating will be prosecuted, leading to an F in the course, and worse.**

**Homework:**

- Occasional required short videos to watch, and optional weekly suggested reading from Stewart.
- Problem sets will be due (usually) twice a week, **on gradescope by 11:59pm ET**.  
See Homework 0, and see page 3 of this syllabus, for important homework information.

**Grading:**

- **Effort:** 5%
- **Problem Sets:** 10%
- **Worksheets:** 10%
- **Midterm Exams:** Best one: 20%. Second best: 20%. Lowest: 5%. (Total 45%.)
- **Final Exam:** 30%

“Effort” is a combination of class attendance (including being on time), class participation, and handing in assignments. It is not proportional; a student deficient in any one of those areas will get a very low Effort grade. (See pages 2 and 4 of this handout for more on attendance and participation.)

“Problem Sets” means actual grades on the problem sets. Late problem sets will be marked down substantially in the Problem Sets portion of your grade (see the webpage for details); but all problem sets handed in by the last day of classes count towards Effort.

“Worksheets” are in-class group assignments on Tuesdays. More information on a separate handout. If an individual student’s Midterm, Final, Worksheet or Problem Set grade is substantially higher or lower than their other grades, and if the student’s Effort grade is strong, I will tweak the above percentages a little for that student to favor the better grades. Overall course grades will be curved.

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## About Cell Phones and Mobile Devices

Cell phones and similar devices have no place in my classroom. Don’t use them. Not for talking, not for texting, not for anything. So at every class:

**Silence your cell phone, put it away, and pay attention.**

## Course Content

First-semester Calculus covers three main topics: Limits, Differentiation, and Integration. Here's a more detailed summary, grouped by chapter numbers from Stewart:

**Chapter 1:** We'll talk about functions, which are the main objects of study in calculus. Most of it should be familiar, but some of the emphasis may be new and fresh.

We'll then introduce **limits**, which are the underlying foundation of calculus. While algebra is about finding the value of a specific (unchanging) quantity, limits allow us to talk about what value a *changing* quantity might be approaching.

**Chapter 2:** We'll use limits to introduce **derivatives**, which are used to compute things like velocities of moving objects and slopes of tangent lines.

**Chapter 3:** We'll use derivatives as a tool to solve other, more complex problems.

**Chapter 4:** We'll introduce **integrals** as areas under graphs of functions. Then, we'll see the Fundamental Theorem of Calculus (FTC), which relates derivatives to integrals. The FTC also allows us to compute some integrals.

**Chapters 5–6:** We'll see some applications of integration to other problems, like computing areas of more general regions and computing volumes of some solids, and then study logarithms and exponentials and their derivatives.

## Necessary Background

You need to know “high school” algebra (simplifying, solving equations, the quadratic formula, and so on), analytic geometry (Cartesian coordinates and graphing functions like lines and parabolas, mostly), and some trigonometry (don't worry, we'll refresh your memory).

On the other hand, if you have already aced Calc I (for example, if you got a 4 or better on the Calc AB test or a 3 or better on Calc BC, plus an SAT Math score of, say, about 680 or above), and you've seen  $e^x$  and  $\ln x$ , and you already know how to do  $u$ -substitution, then you probably belong in Math 121 or higher. Talk to me if you're not sure whether you belong in this class, in a different section of Math 111, in Math 105, or in Math 121.

## Class Participation and Classroom Dynamics

Class participation is part of the Effort portion of your grade. If you are quiet by nature, don't worry; as long as you attend class devotedly, pay close attention, and do the homework and worksheets, you will get full Effort credit. Oh, and by the way, “change” is one of the secret words for Homework 0. That said, finding your voice in class helps you learn better. So for your own benefit, **speak up, ask questions, and even try to answer questions I may ask in class.**

On the flip side, **respect your fellow students** both in and out of the classroom. Treat every person's ideas the same way you would if it had been me or President Elliott sharing them.

## What to Expect

This is not an easy class. The pace will probably be faster than you are used to in a high school math course, and theory and concepts will get a heavier emphasis. The amount of time you'll have to allot per homework problem, as well as the amount of space on the page your answer will require, will probably be more than you're used to, especially later in the semester. You'll have to **show all your work**, and write **clear, organized solutions** that often use a lot of **words** to explain what you're doing.

Meanwhile, this “intensive section” of Math 111 is different from the others. Although the total amount of time you're expected to spend on the class is comparable to that of the other sections (10–12 hours per week, including class time, homework, etc.), we will have an extra class meeting on Tuesdays. At that 80-minute class each week, you will work together in small groups on a worksheet of problems. See the handout on worksheets for more information.

## Homework

Your homework consists of **BOTH** of watching any assigned videos (there will not be very many), **AND** doing problem sets. I'd also suggest you skim textbook sections **before** the corresponding lecture, and then go back and read more carefully to solidify your understanding and to help with the problem sets.

Please note the following **Important Problem Set Rules**:

1. Problem sets are due **on Gradescope**, each by its specified deadline.
2. You must “tag” your problems in Gradescope, marking where each problem’s solution appears. Oh, and by the way, “concave” is one of the secret words for Homework 0.
3. **Write legibly**, and organize your work clearly. **Make it a pleasure to read!**
4. If you worked with other students or got help from a source other than me, QCenter Staff (like Tim) or Math 111 TAs (like Jude), the textbook, or other course resources, then say so explicitly on the first page of your problem set. (See the discussion below on the Statement of Intellectual Responsibility.)
5. The Problem Sets grade for any late assignment will be substantially reduced. The later it is, the greater the reduction; see the course webpage under “Problem Set Rules” for details.

See Homework 0 and the handout on Gradescope Instructions for more information on Gradescope.

I am often willing to grant penalty-free extensions on problem sets; but see “Attendance, Extensions, and Extra Office Hours” on page 4.

I strongly encourage you to work on problem sets together, in pairs or small groups, provided you follow the common-sense guidelines below.

### About the Statement of Intellectual Responsibility

**Exams:** Your work must be entirely your own, so no looking at other people’s papers, no communication, and no outside help. No books, notes, calculators, or other resources are allowed, either.

**Problem sets and Worksheets:** I urge you to collaborate with each other, under the following ground rules:

1. If you collaborate with, say, Jane and Joe, write a note on the front of your problem set saying, “I worked with Jane and Joe.” Use similar notation if you got help from a tutor, fellow student, another professor, another book, the web, etc. However, you do **not** need to write about help you got from me, QCenter staff or Math 111 TAs, the textbook, or course materials.
2. Working together does not mean that Joe does the first half of the problem set and Jane does the second half; everyone should work on every problem.
3. Each student must hand in their own problem set; you can’t hand in a single packet as the work of multiple people.
4. Each student must write up each problem **in their own words**. Working together means discussing the problems. Copying someone else’s solution (even when the source doesn’t mind) is plagiarism and a violation of intellectual responsibility.

**A common question:** What if Joe asks Jane about a homework problem she has already solved? If Joe copies Jane’s solution, both Joe and Jane would be guilty of academic dishonesty, leading to an F in the course for both of them and potentially to dismissal from the college. Instead, Jane can explain her solution to Joe (even showing him what she wrote), before Joe writes up his own solution himself, **in his own words**. Joe would then have to write that he got help from Jane (see rule 1 above), but Jane doesn’t need to write anything unless she also got help in return.

If at any time you aren’t sure about what’s OK and what’s not as far as intellectual responsibility is concerned for this course, talk to me about it.

## Class Attendance, Extensions, and Extra Office Hours

**Attendance:** You should be at every class meeting, and you should be on time. Of course, if you're sick, are in mandated isolation, have a religious conflict, or the like, just let me know (in advance, when possible). One or two accidental misses are OK, too; oversleeping can happen, but it should be **rare**. Otherwise, however,

**I expect you to be in class, and on time, for every class meeting.**

I don't plan to take formal attendance, but I will easily be able to tell who misses class too much; those students' Effort grades will take a hit. (And after more than just a very few unexcused absences, or showing up late too much, your Effort grade will truly plummet, since it's not proportional.)

**Extensions:** You may request **two** homework extensions over the course of the semester, for up to 48 hours. To claim an extension, you must:

1. Not have used both your extensions yet,
2. Request the extension (by email, or during office hours or an appointment) **no later than 8pm ET on the due date**, and
3. Have been attending class devotedly and meeting homework deadlines.

Note: you do **not** need to provide an excuse or reason for your extension request.

**Office Hours:** you are always welcome to attend my regularly scheduled office hours. In addition, **IF you have been attending class and doing the homework**, you are also welcome to make appointments to see me **outside** of my regularly scheduled office hours.

### Getting Help

If you're ever stuck or confused, seek help immediately:

**Office Hours:** Stop by (unannounced) to see me during my scheduled office hours, or make an appointment to see me another time.

**Math 111 TA:** Visit Jude's evening office hours, too. See the course website for details.

**The QCenter:** **Tim St.Onge** of the the Moss Quantitative Center also offers Math 111 help, both for unscheduled drop-ins and for scheduled appointments. See the course website for details of the times and locations of his drop-in hours, and also the "bookingbug" link to schedule an appointment with him.

**Tutoring:** If you feel you need regular one-on-one help from a peer tutor, we can probably set that up. To do so, talk to me first.

### Free Advice (for ANY course)

1. **Go to class.** In particular, go to bed early enough that you don't sleep through your alarm clock. Get to class on time, every time.
2. **Speak up in class.** Don't just try to answer questions I ask, but ask questions of your own. They don't have to be deep or brilliant; sometimes "Wait, what's going on?" is the best question.
3. **Visit Office Hours.** Take advantage of all the office hours: mine, the TAs', and the QCenter's. Feel free to go with a friend if you prefer.
4. **Read the book.** Skim the relevant sections (looking mainly at definitions and theorems) before I lecture on a given topic, and read more carefully afterwards, especially when doing problem sets. Math is best read with pencil and paper at the ready.
5. **Do the homework.** Learning math is like learning to play a musical instrument or a sport: reading about it or watching other people (like me) do it is not enough. The only way to really learn it is to practice over and over and OVER again.
6. **Don't procrastinate.** There will be some hard problems in almost every problem set. Start early, so you'll have time (and the chance to ask questions in office hours) on your side.