Math 211, Section 05, Fall 2018: Multivariable Calculus

MW 11–11:50 AM, Sci Ctr A131; F 11–11:50 AM, Beneski 107; Tu 1–1:50 PM, SMudd 206

Webpage: https://rlbenedetto.people.amherst.edu/math211/
(Also accessible from the Math 211-05 moodle page.)

Instructor: Rob Benedetto
  Office: SMudd 406   Email: rlbenedetto@amherst.edu   Phone: 413-542-8562
  Office Hours: Mon 1–3pm; Thu, 11am–noon; Thu, 1:30–2:30pm; or by appointment.

Teaching Assistants: Michael Bakshandeh and Yuuna Klindziuk
  Michael: Email: mbakshandeh21@amherst.edu   Office hours: TBA
  Yuuna: Email: lklindziuk21@amherst.edu   Office hours: TBA


Exams:
  • Midterm 1: Friday, September 28, in class
  • Midterm 2: Wednesday, October 31, in class
  • Midterm 3: Friday, November 30, in class
  • Final: 3 hours; exact date during finals period is TBA

Calculators, cell phones, ipods, etc. are not permitted in exams.

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

Homework:
  • Reading from the textbook will be assigned each week.
  • Problem sets will be due (usually) twice a week, at the START of class.
    See page 3 of this handout for important homework information.

Grading:
  • Effort: 5%
  • Problem Sets: 10%
  • Midterm Exams: Best one: 20%. Second best: 20%. Worst: 10%. (Total 50%.)
  • Final Exam: 35%

“Effort” is a combination of class attendance, class participation, and handing in problem sets. (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.

Any student who hands in fewer than 50 total homework problems on time over the course of the semester AUTOMATICALLY gets an F in the class.

If an individual student’s final exam or homework grade is substantially higher or lower than his or her 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. Final course grades will be curved.

__________________________________________________________

About Cell Phones and Mobile Devices

Cell phones, ipods, tablets, laptops, and other electronic 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

Single variable calculus concerns functions like \( y = f(x) \); you put in a number, and you get out a number. Multivariable calculus concerns functions like \( z = f(x, y) \) or \( w = f(x, y, z) \); you put in TWO or more numbers, and you get out one number. We'll also consider functions where you plug in one variable and get \textit{out} two or more. As in single-variable calculus, we'll graph functions, take derivatives, and integrate; but the extra dimensions will make things more complicated, and also more interesting. Here's a more detailed summary of what we'll cover:

**Chapter 12: Vectors.** We'll learn how to work with coordinates in two and three dimensions. For students who have seen vectors in physics or other courses, this will be mostly review, but don’t get complacent.

**Chapter 13: Vector-valued Functions.** We'll learn about parametric curves, which can describe the motion of an object through the plane or through space.

**Chapter 14: Partial Derivatives.** We'll start working with multivariable functions like \( z = f(x, y) \) and learn about their derivatives.

**Chapter 15: Multiple Integrals.** These are integrals of multivariable functions.

**Chapter 16: Vector Calculus.** We’ll tie everything together with several theorems that are analogous to the Fundamental Theorem of Calculus.

Necessary Background

The prerequisite for Math 211 is single-variable calculus; you should have studied and be familiar with differentiation, integration, parametric equations, and polar coordinates. (You should also have seen series, but series will not come up in Math 211.) Math 111 and 121 cover all the necessary material. Alternately, if you got a 4 or 5 on the BC Calculus AP exam, you are ready for Math 211. You do not need to have seen vectors before, as we will cover that material in the first couple of weeks. If you’re still unsure whether you belong in this class, come talk to me.

What to Expect

This is not an easy class. The workload will be heavy, the pace will be unrelenting, and the concepts will be challenging. If you’ve never seen vectors before (which is what I am assuming, and so is totally fine), you will notice the fast pace right from the start. If you have seen vectors before, it might be a couple weeks before you start feeling like the pace is fast, but that feeling will come.

On the other hand, don’t be overwhelmed. It’s still just limits, derivatives, and integrals; there just happen to be three-dimensional pictures and more variables. If you go to class, read the book, do the homework, use office hours, and generally work hard, you'll get through it.

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, you will get full Effort credit. That said, even though this is a lecture course, class should be interactive, and participating in classroom discussion helps you learn the material better. So for your own benefit, speak up and ask questions. In addition, when I ask a question in class, I’m usually expecting an answer. If you have even a half-formed idea of how to answer the question, please share it.

Teaching Assistants

Our two Math 211 Teaching Assistants, Michael Bakshandeh and Yuuna Klindziuk, will hold evening office hours a few evenings a week, for you to drop in and seek help. Please make use of them!
Homework

There will usually be two problem sets per week, assigned in class. Your homework consists BOTH of reading the relevant sections from the book AND of doing the assigned problems. (Only the written work counts directly in your grade, but I expect you to do both.) **Start working on each problem the same day it is assigned:** do not put it off until a night or two before it’s due. Please note the following **Important Problem Set Rules:**

1. Problem sets are due in class, at the start of class.
2. Problems must be in the same order as listed in the assignment.
3. **Write legibly,** and leave margins on all four edges of your paper.
4. Multiple pages must be clipped or (preferably) stapled together, not merely folded at the corner.
5. Don’t write on any sheet in the corner where the staple/clip is going to go.
6. Your name must be written on all sheets, in case they get separated.
7. If you worked with other students or got help from a source other than me, the TAs, or the book, then say so explicitly on the first page of your problem set. (See the discussion below on the Statement of Intellectual Responsibility.)
8. The Problem Sets grade for any late problem set will be substantially reduced. The later it is, the greater the reduction; see the course webpage under “Problem Set Rules” for details.

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 talking or passing signals, and no outside help. Unless I specifically allow it, no aids like calculators, cell phones, books, notes, or cheat sheets are allowed.

**Problem sets:** 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.” (Please make sure your name stands out from Jane’s and Joe’s, so I know that you are the author.) 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, the Math 211 TAs, or the book.
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 his or her 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 his or her 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 problem she has already solved? If Joe simply 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, 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. 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. In addition, if attendance becomes a problem, I reserve the right to start taking attendance, and to implement severe grade penalties for students who miss class more than once or twice, or who are late more than once or twice.

Extensions: You may request up to two homework extensions over the course of the semester, each one until the start of the next class meeting at the latest. To claim an extension, you must:

1. Not have taken more than one previous extension,
2. Request the extension (by email, by phone, or in person) no later than 7pm the day BEFORE the due date,
3. Have been attending class and handing in homework on time in the recent past, and
4. Attend class on time on the original due date and the new due date.

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 scheduled office hours, or make an appointment to see me another time.

Math 211 TAs: Visit Michael’s and Yuuna’s office hours, too. Details TBA.

The QCenter: The Moss Quantitative Center is located in the new Science Center, in rooms D109, D017, and D111 of the Science Library. Besides our TAs, Tim St. Onge provides drop-in help in the QCenter, Monday-to-Friday, 11am–3pm. He also makes appointments for one-on-one meetings.

Tutoring: If you feel you need regular one-on-one help from a tutor, it may be possible to set that up through the QCenter. To do so, talk to me first.

Free Advice (for ANY class)

1. Go to class. Go to bed early, so you don’t sleep through your alarm. Be on time, every time.
2. Speak up in class. Ask me questions. They don’t need to be brilliantly phrased; sometimes “Wait, what’s going on?” is the best question. Also, attempt answers to the questions I ask.
3. Visit Office Hours. Stop by unannounced at my scheduled office hours, or make an appointment if you want to see me at a different time. 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, to help you do the problem sets.
5. Do the homework. Learning math is like learning to play a musical instrument or a sport; 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. If you start early, you’ll have time (and the chance to use office hours) on your side.