Math 105, Fall 2013: Calculus with Algebra

Meetings:	MWF 10-10:50 AM and Tu 10-11:20 AM Seeley-Mudd 204
Professor:	**Danielle Benedetto**
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Office Hours:	Mon 12–3:00; Tues 2–4:00; Wed 1–3:00 Thurs 10:30–3:00
Webpage:	`http://www.cs.amherst.edu/~danielle/math105`
	Find all class information, handouts and assignments here. Please bookmark this page.
Text:	James Stewart, *Single Variable Calculus*, 7th edition, Brooks/Cole 2011,
	Mueller/Brent, *Just-In-Time*, 3rd edition, Pearson Education, Inc. 2005
Exams:	There will be three midterm exams and a final exam. The midterms will be in class, on the dates listed below. (The final exam will be scheduled later, by the Registrar.) There are NO EXCUSES, other than incapacitating illness, religious conflict, or the like, for missing an exam. If you do have such a conflict, see me immediately.
Exam Dates:	**Midterm 1:** **Friday, October 4**, in class.
	Midterm 2: **Friday, November 1**, in class.
	Midterm 3: **Friday, December 6**, in class.
	Final Exam: TBA. (It will be three hours.)
Homework:	Reading from Stewart according to the schedule.
	Problem sets will be due (usually) twice a week, **at the START of class**.
Grading:	Computed roughly as follows:

Effort & **Attendance:**	5%.
Homework & **Worksheets:**	10%.
Quizzes:	10%
Midterm Exams:	15% each (Total 45%.)
Final Exam:	30%.

"Effort/Homework" is a combination of class attendance, class participation, and handing in problem sets. Despite the fact that homework is not given too large a value, you are *expected* to complete all of the homework. Quite often, borderline cases for final grades are decided by knowing that certain students made a largely active effort (or lack thereof!!) on homework.

What to Expect

College math courses are generally more rigorous than their high school counterparts. The pace will probably be faster than you are used to, and theory and concepts will get a heavier emphasis. Most of the exercises and exam problems will still be computational, but (especially later in the course) there will not always be routine methods for solving them. Our focus will be more on what limits, derivatives, and (eventually) integrals **are**, rather than on how to blindly manipulate them. Similarly, even on exam and homework problems, I'll be more interested in how you arrived at your answer, than in the answer itself. *Communication is key here!*

Course Content

In this first semester, we will cover two main topics: Limits and Differentiation. Here's a more detailed summary:

- In Chapter 1, we'll talk about functions, which are the main objects of study in calculus. We will review graphing. Most of it should be familiar, but some of the emphasis may be new and fresh.
- In Chapter 1, we'll introduce **limits**, which are the underlying foundation of calculus. While the subject of algebra is restricted to talking about the value of a specific (unchanging) quantity, limits allow us to talk about what value a *changing* quantity might be approaching.
- In 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. The process of finding derivatives is also known as differentiation.
- In Chapter 3, we'll use derivatives as a tool to solve other, more complex problems.

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 (eventually in 106) trigonometry. Don't worry, we'll refresh your memory.

Homework

Homework comes in two forms: textbook reading and problems sets. Both are important. Start each problem set as soon as possible, because some of the problems may turn out to be more challenging than you thought. Your work should be double-checked and written neatly. Unexcused late assignments will not be accepted or graded. Travelling sports players should hand in homework before you travel for an away game. You must hand in your own HW at the start of class.

About the Statement of Intellectual Responsibilty

For exams: your work must be entirely your own, so no looking at other people's papers, no talking to each other or passing signals, and no outside help. Unless I specifically allow it, aids like calculators, iPods, cell phones, books, notes, webpages, or cheat sheets are not permitted in exams.

For problem sets: you may interact with other students discussing problems. Still, the work must be your own, even if you received substantial input from others. Each student must write up each problem **in his or her own words**. Obviously, copying someone else's solution (even when the source doesn't mind) is plagiarism and a violation of intellectual responsibility.

Getting Help

If you get stuck on a problem, or you're feeling lost in the material, or anything like that, there is a lot of help available out there:

Office Hours: Stop by (unannounced) to see me during scheduled office hours. Make an appointment to see me another time.

The QCenter: The Moss Quantitative Center is located in 202 Merrill Science. They provide drop-in help afternoons and evenings and some one-on-one tutoring.

Peer Tutoring: If you feel you need several hours of help a week, you might want to get a peer tutor. Please talk to me about it first.

Expectations and Advice

- **Attend class religiously;** in general, a Calculus class moves very quickly, and the material repeatedly builds on itself daily. I will not reteach material for unexcused abscences. Simply put, I strongly discourage you from skipping class!!
- **Be on time;** if you miss the first five minutes, you'll be behind and confused for the next forty-five. Besides that, honestly, it's disrespectful to the professor.
- **Come to Office Hours regularly;** please never be embarrassed to come ask for help!! One of my favorite parts of teaching is helping students in office hours. I "expect" to see all of you there at some point. Take advantage of my help; I become really invested in my students.
- **Be patient;** if you feel like you are struggling, come see me. I'm so happy to help!! However, if you feel like you are bored because the class is moving too slowly, talk to me. You might belong in another class. Otherwise, count yourself fortunate to be comfortable with the material. Based on the pace of the course, that could change at any time
- **Read the book;** search the sections looking for relevant definitions, theorems, examples.
- **Do all of the problem sets;** my experience with teaching convinces me it's absolutely vital for success with learning the material. If you believe that you don't need to do the homework, then you probably belong in another class. Ultimately, we are all here to truly learn, so please make this a commitment. Assignments are designed carefully and are important.
- **Don't procrastinate;** start homework early. Do not wait until the night before it is due. Otherwise, you can't take advantage of my office hours before the due date.
- **Class participation is encouraged and expected;** ask and answer lots of questions. Always get concerns clarified during lecture. Usually other students share the same question. Meanwhile, please show respect for other people's questions.
- **Make an impression!** If you are skipping class regularly and not handing in problem sets, you are essentially telling me you aren't taking things seriously. **Being attentive in class, visiting office hours, and completing problems sets make strong impressions.**
- **Take responsibility!!!** Please do **not** take this class if you plan to disregard the class or work. Trust me, I imagine that you will do poorly.
- **Be respectful;** please **NO** cell phones or texting in class or office hours!

Math 105 and 106 Philosophy

These courses together cover the material of Math 111 at a more relaxed rate. In particular, there is more time to absorb the calculus. However, between the homeworks, worksheets, and exams, you will have at least as much work as you would in Math 111, so work hard. If you get behind, it can be hard to catch up.

Math 105 assumes no previous knowledge of calculus, though it does assume that you have a solid background in algebra and (eventually) trigonometry. We will review the necessary parts of algebra and trigonometry when they are needed. This is where the "Just-In-Time" book comes in. Specifically trigonometry and exponentials and logs are postponed until Math 106.

Math 105 introduces the first major topics of calculus, limits and the derivatives. We will also review strategies for getting control of complicated algebraic experessions. Math 106 introduces the last major topic of calculus, integrals.

Structure of the course

Lectures: Lectures are vital to your success. Do not miss them! Even if you have seen some calculus before, we will most likely be covering material in more depth than you are used to. *Read over your class notes daily.*

Worksheet Labs: Our course meets for an extended time on Tuesdays in order to do worksheets that help students learn the material in a more active mode. The work is done in small groups, with a goal of not just *doing* the problem, but rather of *understanding* what is really going on. The problems are interesting and varied, though definitely not easy. Problem solving sessions have been tried at other schools and have been found to help students deepen their understanding of calculus. You should be able to clearly explain your solutions to other people in your group. The philosophy is based on *active learning* (class should be more than just taking notes) and *getting smarter at math* (working hard in the right way can make you smarter). You should prepare for worksheet days by reading over your notes completely.

Quizzes: We will usually have a weekly quiz. It will help keep you on track with the material, as well as allow me to make personal comments to you before the actual midterms happen.

Homework: Do **all** of it. **No Late Homeworks!**