

FALL 2006 MATH 2200 COURSE SYLLABUS

Course: MAT(H) 2200: Differential Calculus
Instructor: Pete L. Clark, Ph.D.
email: pete@math.uga.edu
Lectures: TTh 12:30-:145 pm, Life Sciences C114
My Office: Boyd 502
My Office Hours: Tuesday 11:15 am - 12:15 pm, Wednesday 11am - 12 noon

The course text is Edwards and Penney, *Calculus*, 6th edition. It is *required* for the course, and (most of) the homework will be assigned from it¹.

Topics covered: You are *responsible* for the material in Chapter 1, although only one class period will be spent on (some of) this material. We will cover Chapters 2 – 4 in their entirety, as well as some material from §5.2 and §8.3. We may also discuss *Taylor polynomials* (which is covered in §10.4 of your text, but don't look there now: this material can be presented in a much easier way).

Last Day to Withdraw: Monday, October 9

Final Exam: Tuesday, December 14, 12-3 pm

Evaluation of your course grade: There are four components: (i) homework, (ii) weekly quizzes, (iii) three midterm exams, (iv) final exam.

Remark: Everything after this point is a guideline: in particular, grade breakdowns are *projected*, and are subject to change. Such changes will be made in good faith (i.e., will never be done with the purpose of adversely affecting your grade) and for good reason.

Estimated breakdowns:

Composite Homework Grade: 10%
Composite Quiz Grade: 15%
Midterm 1: 15%
Midterm 2: 15%
Midterm 3: 15%
Final: 30%

Since the final exam will be comprehensive – i.e., will cover material from the entire course – it is reasonable to reward a strong performance on the final exam by having it count for more than 30% of your course grade. This will be done

¹So that a prior edition, which presumably presents almost entirely identical content, will not do, unless you are energetic enough to repeatedly consult a library copy for statements of problems.

(roughly!) as follows: if you receive at least a B on the final, then – if it is to your advantage – the final will count as 35% of your grade. For $B+$: 40%. For $A-$: 45%. For A : 50%. For that (probably hypothetical) student who has been struggling throughout the course but turns in an $A+$ – i.e., virtually perfect – final exam: we'll cross that bridge if we come to it.

Now I shall describe the various components in more detail:

Homework is to be turned in every Thursday. At the time of the writing of the syllabus, there is no grader for the homework (i.e., the department has not allocated funds). This is unfortunate, and I am considering using my own funds to hire a grader. Note that in any case homework counts for a non-negligible percentage of your course grade. Assuming there is no grader (other than me), it may be that only selected portions of your homework will be graded (read: the hardest problems), and you will be given full credit for the rest. Every assignment will contain problems from the textbook, but I may also assign other problems. Homework will be announced on the course (e)mailing list and (once it gets constructed) the course webpage.

You should know – and know that I know – that (rather brief) solutions to the odd numbered problems appear in the back of your textbook. I will assign a certain number odd-numbered problems so that you can check your work; presumably the problems which get graded will be even-numbered.

Let me make some general comments about written work: students in math classes seem to think that the goal is to get the numbers correct, and that complete, carefully worded sentences are for their other courses. **NO WAY.** Unless you are explicitly instructed to the contrary – e.g., on quizzes and certain midterm questions, when time is a pressing issue – your written work should consist of carefully reasoned and carefully presented arguments, not just strings of equations.

For instance:²

Question: Find the equation of the line passing through the points $(1, 2)$ and $(-3, 7)$.

Solution 1:

$$\begin{aligned}
 y &= mx + b. \\
 m &= \frac{7 - 2}{-3 - 1} = \frac{5}{-4} = -\frac{5}{4}. \\
 y &= -\frac{5}{4}x + b. \\
 2 &= -\frac{5}{4}(1) + b. \\
 b &= 2 + \frac{5}{4} = \frac{13}{4}. \\
 y &= -\frac{5}{4}x + \frac{13}{4}.
 \end{aligned}$$

²This example is inspired by an article of Bill McCallum, appearing as an appendix in *How to Teach Mathematics*, by Steven G. Krantz. (Yes, there is such a book.)

We have here a string of equations with no justification; the last one happens to be the correct answer, but the logic of the process is missing. This solution would receive half credit.

Solution 2: Any (nonvertical) line can be written in the form $y = mx + b$, where m is the slope. Here the slope is

$$m = \frac{7 - 2}{-3 - 1} = -\frac{5}{4},$$

so the equation of the line is

$$y = -\frac{5}{4}x + b,$$

and b is a constant still to be determined. We can find it by plugging in any point on the line, say $(x, y) = (1, 2)$:

$$2 = -\frac{5}{4}(1) + b.$$

Solving for b , we get

$$b = \frac{13}{4}.$$

So the equation of the line is

$$y = -\frac{5}{4}x + \frac{13}{4}.$$

This solution receives full credit (despite the fact that the algebra itself has been presented in *slightly less* detail).

Solution 2 takes up more space than Solution 1, but go back and read them both again: isn't it faster (and more pleasant) to *read* Solution 2 than Solution 1? Solution 2 is one intelligent person communicating with another; perhaps Maple is the author of Solution 1. Finally, one can see what is going on in the author's head in Solution 2: if there is a mistake in the reasoning, we will be much better able to find it.³

On the format and appearance of your homework: you may (and almost certainly will) turn in handwritten solutions, but they should in all other aspects be treated with the same conventions that you would an actual "paper" for another class. Would you turn in a paper for an English class which is illegible, or with large portions messily crossed out, or with pages hanging loose, or paperclipped, or with the corners torn and folded back together in some home-made way? Of course you would not. You are now attending an internationally renowned university: invest in a stapler. Also be careful about your spelling and grammar: although I will not take off points for these sorts of errors, if I see that you cannot even *spell* "continuous functions" I will, whether I consciously want to or not, end up wondering how you could possibly understand them.⁴

³Mathematics papers are indeed written in complete sentences – with, perhaps, some equations thrown in, but always with explanatory text. When a mistake occurs in a math paper – and it is also true that professional mathematicians sometimes make mistakes, even when they are trying their hardest not to – it usually occurs "between the lines," i.e., the author has given too little detail to some key point.

⁴I will be more sympathetic if English is not your native language.

Collaboration on homework: You are certainly welcome to do; indeed I encourage it. (You may also get help from tutors, graduate students, and other similarly more mathematically experienced characters, although after a certain point this is less warmly encouraged.) The philosophy here is that the purpose of the homework is to get you to *learn* the material and not to *test* you on your knowledge of the material. I will ask you to write up your final results independently from one another, and if I can see that this is not the case, I will speak to you about it. The point here is that *plagiarism* is an issue taken with extreme seriousness in many sectors of academia. It turns out to be a less serious issue in mathematics, for reasons that I will not get into here. It is also a sticky issue, in the sense that there is a sort of continuum: in academic life, stealing whole cloth someone else's work and passing it off as your own occurs quite rarely⁵; but perhaps you use others' nice turns of phrase without attribution; perhaps your ideas about social justice are essentially recapping those of some essay you read; there are many examples.⁶ My point is that you do not want to acquire bad habits in this area.⁷ In fact, if you collaborate with other students, write down the names of your collaborators somewhere in your assignment. This is not any kind of admission of guilt; in fact it's just the opposite.

Quizzes: We will have in class quizzes every Tuesday. They will generally be short: a maximum of 15 minutes, and sometimes much less. (For instance, imagine Question 8 on the survey I sent you as a quiz: if you can't answer this question in a minute or two, you can't answer it at all.) A certain number of lowest scores on the quizzes will be dropped – we will aim to keep roughly ten quiz grades. Missed quizzes *cannot* be made up: that is part of the reason why we drop grades. Also, there is no formal attendance policy, but obviously missing too many classes will adversely affect your grade.

Midterm exams: We will have three midterm exams, each given in class and lasting about an hour (i.e., most of that class). I don't want to give precise dates now, because I don't want to rush to cover certain topics in time for some prescheduled exam. Looking at one of last fall's syllabi for this course, I found the dates September 8, November 3 and December 6 for the three midterms; these are in the right ballpark. Especially, only the first midterm comes before the add/drop deadline; this is part of the reason for having so many quizzes.

Good news: I will make every effort to give you *two weeks' notice* of each midterm exam. The first exam will be immediately after we finish the material of Chapter 2, so about three weeks to a month from now. A week before each midterm a *sample exam* will be made available. This will give you a good idea of (i) the format of the actual midterm (in particular the number of problems) and (ii) the level of difficulty. The sample and the actual exam will be written at the same

⁵Actually this happened to an apparently distinguished social scientist at the University of Chicago while I was an undergraduate there: he stole whole chapters in his book from his own graduate students. To my mind, he got off rather lightly – i.e., he's still there.

⁶There is now computer software which can scan whole books and search for this kind of thing. I recently read an article in which Ann Coulter's latest book was fed in and scored quite high on the "plagiarismometer."

⁷E.g., compare footnote 2. Would anyone accuse me of plagiarism on a syllabus? Of course not. But I am in the habit of making such references.

time, and care will be taken that they are not *too* similar: the midterm will *not* be just the sample midterm with different numbers. Moreover (and here is some real information for you), if a conceptual question on the midterm appears to be the same as one of the sample midterm, be especially careful, because it will not be.

Example: If the sample midterm contains the question

“Is a differentiable function necessarily continuous? If not, give a counterexample.”

then perhaps the actual midterm will contain the question

“Is a continuous function necessarily differentiable? If not, give a counterexample.”

Not only are these not the same question, they do not have the same answers. For the first question: “Yes.” For the second: “No: e.g. $f(x) = |x|$ is continuous but is not differentiable at $x = 0$.” (It may be a few weeks until these questions and answers make sense to you.)

Midterm exams cannot be made up. If you know you are going to miss a midterm, let me know *in advance*, and if I find your reason acceptable (for instance, if you are a varsity athlete and have an “away” game, I will accept this for *one* of the exams) I will excuse you from the midterm, which means that your midterm grade will be computed based on the other two exams.⁸ If you just do not show up for a midterm, you will be excused only for medical reasons (or for some truly exceptional situation). It is your responsibility to arrive on time for exams: plan on getting to campus at least an hour early on any exam day.

Final exam: It will be given on Tuesday, December 14 and will cover material from the entire course. There will be a sample final exam and probably at least one additionally scheduled review session.

Cheating: Cheating is, by definition, not permitted. The only question is how strenuously it is frowned upon. You will find that academia is much more like the Internal Revenue Service than Major League Baseball in its attitude towards cheaters. As a UGA faculty member it is in fact *my job* to try to minimize cheating and to impose severe penalties on those who have cheated (in this course, on quizzes, midterms or the final exam). It would be pointless and unpleasant to spell things out here, but you should be warned that the *minimum* penalty imposed for cheating on a test (including a quiz) is a grade of 0 on that test. Repeated and/or especially egregious instances of cheating (having a “ringer” take a test in your place is especially egregious) could result in your expulsion from the class (with a failing grade) and/or your expulsion from the university.⁹

⁸Explicitly, that means that the missing midterm grade will be defined to be the average of the other two midterm grades.

⁹Students who are accused of cheating have certain rights. There is, alas, no “eject” button on the underside of my desk that I can press when I think someone is cheating: many university officials will get involved. The whole thing is certainly no fun for me either, and I very much hope it does not arise.