

Math 1361
Calculus II
Fall 2009

Instructor:

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Office Hours (fall '09):

Monday 2:45–5:00

Tuesday 9:00–11:15

Wednesday 8:30–9:30

Friday 3:15–5:00

...and by appointment or chance.

Text:

James Stewart.

Calculus (early transcendentals)

(6th edition)

Albany: Brooks–Cole, 2008.

Student Mentor:

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The original purpose of Calculus was to serve as the mathematics for describing motion, and each of the two branches of the subject—*Differential Calculus* and *Integral Calculus*—revolves around its own motion question. Differential Calculus is the theory of the derivative, which answers the question: How do you find the velocity of an object if you have a record of its positions at all times t ? The second branch, Integral Calculus, turns this question around and considers how to use velocity to calculate *displacement*—change in position.

What the course will cover. Much of the semester will be devoted to Integral Calculus; the main concerns will be developing methods for evaluating integrals and using integrals to solve problems. (There are many questions other than the displacement problem which are solved by evaluating integrals.) The sections of the text that are relevant to this part of the course are: Ch. 5, §5; Ch. 6; Ch. 7, §§1–3, some of §§4–5, and §7; Ch. 8, §§1–3. In the last part of the semester, you will be introduced to the difficult but powerful method of *power series*, which makes it possible to represent many functions as “infinite polynomials.” Here, the relevant sections of the text are: Ch 11, §§1–10. Finally, there will be one or two Maple labs.

Objectives. By the end of the semester, the successful student will be able to:

- compute antiderivatives for a wide variety of functions;
- compute areas, volumes, and arc lengths using definite integrals;
- recognize when a problem can be solved by computing a definite integral;
- evaluate improper integrals;
- determine whether a wide variety of infinite series converge or diverge; and
- compute Taylor series, use Taylor polynomials for estimates, and estimate errors.

Homework. Homework will be assigned almost every class. I will provide guidance and feedback in several ways: I will take questions on specific problems at the beginning of each class; I will be happy to examine solutions you write up and provide oral or written feedback; and I will be happy to discuss homework (and anything else!) during office hours or by appointment. I will also distribute my own worked solutions to about 40% of the problems I assign; these are meant to serve as a detailed check for your work.¹ It will be

¹ Many students find that the answers at the back of the text do not help them pinpoint errors.

up to you to **use these solutions intelligently**: simply reading my solutions in place of struggling with the problems yourself will not teach you the material and will not prepare you for tests or quizzes.

Once a week, I will collect homework and have the student mentor grade some problems on the homework. (She and I will select which problems to grade, but you will not know in advance which these will be.)

It is extremely important that you keep up with the homework, which is really the heart of the course. The only way to learn this material is by doing; you must put in a lot of time concentrating on the concepts and techniques that will be flying at you in order to master them. This includes time spent staring at hard problems and maybe getting nowhere; time spent like this is **NOT** wasted. You must also read the text and your class notes in concentrated fashion, with pen and scratch paper at hand. You should probably plan to spend about 15 hours per week, preferably in several separate sessions, on these tasks.

I strongly encourage you to work on homework together; but each person must write each solution to each on his/her own.

Tests and grading. There will be two *in-class exams* (to be given on Monday 10/5/09 and on Monday 11/16/09) and a *final exam*. There will be short weekly *quizzes* (given on Mondays that aren't test days); these will be averaged so that points on quizzes are given equal weight.² Each Maple lab will count as one quiz.

Your final average will be a weighted average of these various components. I will compute it with the formula

$$\text{final ave.} = \frac{2 \cdot (\text{midterm \#1}) + 2 \cdot (\text{midterm \#2}) + 2 \cdot (\text{QZ average}) + 3 \cdot (\text{final exam}) + 2 \cdot (\text{HW average})}{11}.$$

My grading scale is the standard one: 93% earns an *A*; 80% earns a *B*; 70% earns a *C*; and 60% earns a *D*.

Additional Notes.

Note 1: Reading the text. Although most of the ideas and techniques you are expected to learn will be discussed in class, time constraints make it impossible to do every single *i*. This makes it especially important for you to read each section of the text as we get to it. You will derive a bonus benefit from doing this: you will have two different points of view, Stewart's and mine. This can really help you to put the harder ideas into perspective: it is analogous to seeing a photo through a viewmaster or hearing music in stereo.

Note 2: Attendance. Class attendance is mandatory. I will take roll most days and maintain attendance records, and I will allow you two unexcused absences. Each unexcused absence after the second will reduce your final average by 5%. (If for some reason you need to miss a class, it is your responsibility to find out what you missed. You can do this by talking to me or to a classmate.)

Note 3: Keeping the instructor in the loop. Since the majority of you are freshmen, I should probably add a word about one difference between high school and college. In college, your teachers will not keep as close an eye on you as your high school teachers did. This makes it primarily your responsibility to keep up, or—if you are having difficulties—to let your instructor know about them. I will be happy to discuss homework, class work, the text, or any other aspect of the course with you; in fact, I believe that the most effective teaching is one-on-one teaching. But you must take the initiative; the ball is in your court.

Note 4: Calculators. You are required to have a calculator, which may be either a scientific or graphing calculator. You may use your calculator to do homework and in all tests and quizzes. However, in order to maintain a level playing field, I must forbid the use of symbolic calculators (such as the TI92) in tests and quizzes; and so I strongly discourage you from becoming dependent on such a calculator as a crutch.

Note 5: Cheating. Cheating is unacceptable.³ If you are caught cheating in any test or quiz, you will receive a zero; if I think the infraction warrants, I will impose a further penalty. A second infraction will result in an automatic grade of *F* for the course.

² That is, your quiz average will be the fraction: $\frac{\text{your total points}}{\text{maximum possible total points}}$.

³ Working together on homework is **NOT** cheating, of course, since I want you to do this.

Note 6: Some of you will find the material difficult and the pace fast. This cannot be helped—Calc II is hard, and there is a lot of it. These thoughts may be of use, though.

1. Math is hard, and the fact that you have to work to learn it does not mean that you are unable to do math or that you are not cut out for it. It is not you; it is the material. **Everyone** (not just you) finds it hard; in order to learn it, **everyone** must persevere. You will not understand everything with crystal clarity the instant it is presented, and even material you have understood won't always stay with you. Really owning the material will come only you have studied it a few times on a few separate days. You should thus study each new topic at a few separate times; the ideas will become clearer each time you review them. (And it is essential that you really internalize them and make them yours, because the material builds, and you will be much better able to master the later material if you have already mastered what came before.)

2. You should review the notes from each class to resolve any points that are not clear; ideally, this should be done before the next class. If necessary, please contact me for clarification.

3. Another good idea is to keep a looseleaf notebook with your own notes on the main ideas; you can keep your own worked solutions to the problems for each topic by your notes on that topic. The first time you study the material, write the ideas in your own words as notes; the second time, have both your notes and your other materials in front of you, in order to modify your notes. From then on, you may be able to use just your notes for review.

4. The reward for the time and effort you will be putting into this course is that you learn powerful ideas and techniques that greatly extend what you understand and what you can do.

Note 7 (from Jim Scott): Those who have or think that they may have a disability (learning, physical or psychological) are encouraged to contact Services for Students with Disabilities—Room 113, Science Center, (610) 660-1774 or (610) 660-1620—as early as possible in the semester. Accommodations can be provided only to students with current (within 3 years) documentation. Students are encouraged to discuss their instructional (“reasonable academic adjustments”) and accommodation needs with their professors.

All student requests for extended time to take examinations in a distraction-free environment must be discussed with the professor a minimum of one week prior to the scheduled date of the exam; the student must complete the Extended-Time Request Form, obtain the professor's approval, and submit the form to the this office a minimum of 3 days prior to the date of the scheduled exam. Failure to follow these procedures could result in a denial of the request. Exceptions to exam schedules require prior written approval of the professor.