

Syllabus

Math 125 - Calculus for the social sciences

Fall 2008

Professor: Rafe Jones

Office Hours: Mon 9:00 - 11:00, Tues 3:00 - 4:00, Weds 11:00 - 12:00, or by appointment

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Text: *Calculus: concepts and contexts, 3rd edition* by James Stewart.

Meeting times: TR 9:30–10:45AM in 112 O’Neill (Section 4), TR 8:00–9:15AM in 112 O’Neill (Section 5).

Course Web Site: <http://www.mathcs.holycross.edu/~rjones/Math125/>

Course Content and Goals: All around us, all the time, things change. Cars move down a highway, the US gross domestic product changes with time, the number of cells in your body increases or decreases. Calculus is the study of functions, which are mathematical objects that encode change. In this class we’ll learn how to analyze the rate at which a function changes, called the *derivative* of the function. The derivative has many applications to economics and the natural and social sciences, and we’ll see a good sampling of both. We’ll also meet an array of functions that are used to model many phenomena in economics and the sciences.

More specifically, we’ll discuss functions (basic concepts as well as exponential, logarithmic, and trigonometric functions), limits, derivatives, and applications of derivatives. These topics correspond to the first four chapters in the book. There is a day-by-day course schedule available on the course website.

By the end of this course, I expect you to:

- Be familiar with the properties of basic functions that appear again and again in the natural and social sciences (for instance, polynomials, exponential functions, logarithms, trig functions).
- Understand that functions are the main mathematical tool used in math modelling, and how to select a function that appropriately models a given process in economics or the natural or social sciences.
- Understand how limits are the key idea behind the derivative, and how to take limits of a variety of functions.
- Understand what the derivative tells you about a function, how to differentiate a broad variety of functions, and how to use the derivative to extract certain information about the function (for instance its maximum, or its rate of change at a given moment).
- Be able to express yourself mathematically in a clear way.

Getting information and help: If you have questions about any organizational aspect of the course, the first place you should go is the course web page (URL given at the top of the page). It is a veritable treasure trove of course-related information, and will be updated frequently.

Among the things you'll find there are this syllabus, homework assignments, class schedule, exam-related announcements, review tips, links to practice exams, and the meaning of life.

If you can't find the information you need quickly on the webpage, or have a mathematical question, don't hesitate to contact me. I will read emails until about 7 pm each night, and will respond to any messages you send me within 24 hours, provided that I am not traveling. For face-to-face discussions, stop by any time during my office hours, listed above. I'm also happy to see you outside of office hours, though I prefer you to make an appointment in advance. If you stop by outside of office hours without having made an appointment, I'm likely to be busy and not able to help you right then.

For additional help in the evenings, you are encouraged to go to the Calculus Workshop. It provides drop-in peer tutoring on a first-come, first-served basis. It's open Sunday through Thursday, 7:00-9:00PM in Swords 328 (beginning September 7).

Finally, I may periodically need to contact the whole class via email, for instance to let you know that there are new materials on the website. I'll use your official Holy Cross email accounts (the ones that end in holycross.edu), so be sure that you check this account regularly.

Grading system: Below is how your course grade will be determined. Following this there are detailed discussions of each component.

Homework 10 %

Writing assignments (2) 10 %

Midterm Exams 20%, 20%, 10% (in decreasing order of scores)

Final Exam 30%

The exact cutoffs for each grade level will be determined only after the final. However, at any time during the course I will be happy to give you an assessment of where your grade stands.

Exams: The exam schedule is given below; please note these dates and plan accordingly. Any conflicts must be legitimate and brought to my attention well before the exam is scheduled. If you have any specific learning disabilities or special needs and require accommodations, please let me know early in the semester so that your learning needs may be appropriately met. You will need to contact Dr. Neil Lipsitz in Disability Services (Hogan 209, x3693) to obtain documentation of your disability.

Exam 1: In class, Thursday, October 2

Exam 2: In class, Thursday, October 30

Exam 3: In class, Tuesday, December 2

Final Exam: 2:30-5:30 pm on Wednesday, December 17 (section 4), and 2:30–5:30 pm on Friday, December 19 (section 5)

Homework: The homework exercises are the most critical component of your learning in this course. The best way to cement your understanding of this subject is to work through a wide variety of problems, so it is vital that you do the homework. Moreover, the questions on exams and quizzes will be very similar to the kinds of exercises given in the homework. On homework problems as well as exam and quiz problems, a correct solution to an exam problem consists of more than just writing the correct answer: I must be able to understand how you arrived at your answer.

Assignments are posted on the homework page of the course web site. Homework is due at the beginning of class on Thursday each week. *Late homework is not accepted.* Your lowest HW score will be dropped. Please staple your homework and write your name on the first page. Failure to do this may result in the work not being graded.

Learning often happens best when we are forced to explain our work or thinking to someone else. Sometimes just verbalizing your mathematical thoughts can deepen your understanding. So I encourage group working on the homework (groups of two or three tend to be most effective). However, you must still each write the problems up on your own. *Turning in homework that is identical or substantially identical to the work of another student constitutes plagiarism.* See the statement of academic integrity on the course website for more detail.

Writing Assignments: There will be two writing assignments during the semester, each worth 5 % of your grade. These assignments are in-depth explorations of a particular problem, and you'll be required to work in groups of two, and write up your solution in the form of a letter to an intelligent non-mathematician. Grades will be based on the correctness of the math as well as the clarity of the writing. The first assignment will be handed out the week after the first midterm, and due the week before the second midterm. The second assignment will be handed out the week after the second midterm, and due the week before the third midterm. For exact dates see the course schedule available on the website.

Calculators: A graphing calculator is recommended for this course, but it is not required. The TI-81 or TI-83 (or similar models) is sufficient for this course. My exams are conceptual, rather than computational, in nature. For this reason, graphing calculators are not allowed on the exams. The Department will loan simple scientific calculators during the exams – you may provide your own with prior approval from your professor.

Attendance: Attendance is important to me and could make a difference in your final grade in borderline cases. Please make the effort to come to class on time. It is not easy to catch up in a mathematics course, where each lecture builds on the previous material. This is particularly true for a course that meets only twice a week! If you contact me ahead of time and the absence is excused, then I will make every effort to provide you with the information that you missed. Otherwise, it is your responsibility to get notes from one of your peers and to make sure that you understand the material.

How to do well in this class:

- *Attend class, participate, and ask questions.* Class will significantly augment the material in the book (particularly in worked examples), and there will be lots of chances for you to participate. The more engaged you are in class, the better prepared you will be to understand the ideas and work problems.
- *Do all the homework, and do it well.* The best way to learn math is by doing math. The homework is your chance to do math, and you will gain the most understanding by doing it well. This means that after you finish each problem, you should be able to explain the idea to your classmates, your friends, or your mom.
- *Work with your classmates.* The knowledge and abilities of your classmates are great assets. Learn to explain mathematics to your classmates. Math can be fun and rewarding when there are people around you who enjoy figuring out problems as much as you do. Take advantage of this opportunity and organize study groups.
- *Get extra help when you need it.* You have lots of options for getting extra help (see the section "Getting information and help"). Don't hesitate to use them! In particular, please come talk to me if you're feeling stuck.