

Mathematics 115, Fall 2003
Functions of a Real Variable
Syllabus

<http://math.stanford.edu/~munson/math115.html>

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Office Phone	3-7829	Office Hours	M 4-6
Office Hours	M 2-3:30 Tu 1-2:30		Tu 11-12 & 3-5 Th 11-12

Text: *Elementary Analysis: The Theory of Calculus* by Kenneth A. Ross, 13th printing.

Course Description and Goals

Calculus has had tremendous success in describing and helping us understand many complex processes. It is the primary mathematical tool in physics, engineering and economics, yet most of us really don't understand why it works. This course is designed to help us understand the theoretical underpinnings of calculus. To this end, the most frequent question we will encounter in this class is "Why?", we should turn this on the course itself, and ask: "Why is it important to learn how calculus works?" The answer brings us to the real goal of this course: to learn how to think better and express our thoughts more clearly. Throughout this quarter we will talk about proof techniques and especially focus on writing clear proofs. This means understanding some logic and remembering to adhere to the rules of grammar when writing a proof. Learning basic proof techniques and focusing on lucid exposition will help you discover what you don't understand very quickly.

As I mentioned, we are trying to learn to think and express ourselves better, and it will be useful at times to step away from what we are doing in class and try to understand this mathematical experience. For this we will read some literature, which will consist of short stories, poetry, and excerpts from novels. Twice during the semester I will hand out a short packet of readings a week or so before the class discussion, and you are to turn in a reaction to the readings the day of the discussion, which should be at least one page long. What you write in your reactions is what we are going to discuss in class, so think carefully about it. Your participation is absolutely crucial to this being a successful discussion.

Very quickly, we will begin by talking about logic and proof techniques, and apply these to some more familiar situations such as Euclidean geometry and properties of the integers. We will then move quickly through chapter 1 of the text, pausing to mention some subtleties and important properties of the real numbers. Next is chapter 2 and a discussion of sequences, one of our most important tools. We will proceed to apply our knowledge to the study of continuous functions in chapter 3,

differentiable functions in chapter 5, and integration in chapter 6. If there is time, we will discuss chapter 4, which deals with sequences and series of functions, and cover Taylor's theorem.

Course Grade and Policies

Homework and Writing Assignments: 20%

Exam 1, Wednesday, October 15: 20%

Exam 2, Wednesday, November 12: 20%

Final Exam, Monday, December 8, 8:30-11:30 AM: 40%

Homework is by far the most important work you will do in this course. You should begin working on it as soon as possible, since running into something that is not immediately obvious is commonplace. I encourage you to work together and to come see us for help, but be careful not to get in the habit of using us or your classmates as a crutch. Being stuck is incredibly good for you, believe it or not. Some advice that will take you quite far: memorize the definitions and try to understand them in plain language as much as possible. Late homework is not accepted.

As I mentioned above, there will be two reading packets distributed during the semester. These will count as part of your homework grade (together with your participation during discussion, they count for the equivalent of one homework each), and should be at least a page long. You should plan on discussing what you wrote and more during class that day.

Both exam 1 and 2 will be in-class 50 minute exams. Show up a little early to get yourself comfortable and make sure you get as much time as possible.

The final exam will be three hours and comprehensive. There is no make-up of the final exam under any circumstances.

Office Hours policy: You should come to office hours prepared to do some hard thinking. If, for example, you are having trouble with a homework problem, then you should come prepared to show us what you have done and where you are getting stuck. If you're having trouble understanding a concept, then be prepared to explain it to me, even though you think you don't understand it. I like to run office hours by having you, the students, leading the session at the chalkboard. I spend enough time there already. I want to emphasize that your homework is for YOU to do, and it will do you no good to have me do it for you.

Important Dates

October 12: Add deadline.

October 15: Exam 1.

October 19: Drop deadline.

November 12: Exam 2.

December 8: Final Exam, 8:30-11:30 AM.