Math 115 (Functions of a Real Variable) — Spring 2018
George J. Schaeffer — Department of Mathematics, Stanford University
Course Information and Policy Document

Course Staff
Dr. George J. Schaeffer — Lecturer
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* Please read the Online Interactions section below before emailing us. Importantly, questions on problem sets will be answered using an online Q&A form, and not by email.

Course Website
The course website is http://stanford.edu/~gschaeff/115-18s/. All course materials will be available on the course website or linked from it. We will not be using Canvas this quarter, (or any other quarter, so long as I’m in charge!).

Syllabus
Math 115 is a 10-week course on introductory real analysis, a branch of mathematics whose fundamental results form the basis for what you probably already know as calculus. In contrast with a typical calculus course, Math 115 is proof-based; a significant emphasis will be placed on developing your mathematical writing, reading, and comprehension skills.

Our stated material goal will be to prove the fundamental theorem of calculus starting from the axioms of the real number system. Along the way, we will prove a number of results from calculus, some familiar (e.g., the intermediate value theorem), and some less so (e.g., the Bolzano–Weierstrass sequential compactness theorem). Time permitting, we will discuss a selection of extra topics (the construction of R, metric spaces, sequences of functions, Lebesgue integration, etc.), some of which will also be explored in the weekly problem sets.

Prerequisites
The official prerequisite is Stanford’s Math 51 (linear algebra and multivariable differential calculus) course. However, since neither linear algebra nor multivariable differential calculus play a role in 115, the course should be accessible to any motivated student who has taken a course on single-variable calculus.
Textbook

Calculators
In general you will not be required to use a calculator for this course, and calculators are prohibited during exams. Some problem sets may have a minor computational component, but no programming will be involved, and any required resources will be available online for free.

Course Organization and Materials
In a typical week you will attend two lectures and complete one problem set. The course staff will also hold regular office hours during the week.

The course begins on Tuesday, April 3rd and ends on Tuesday, June 4th. The midterm exam is scheduled for **Tuesday May 8th, in class**. The final exam is scheduled for **Monday, June 11th, 12:15–3:15 PM**.

Because of time constraints it is unlikely that we will be able to cover every nuance of the material in the Greatest Possible Detail during lectures, which is why I will occasionally assign required readings in the textbook or that I have written up for you myself.

You are responsible for all material covered in lecture, all assigned readings and handouts, and any supplemental material presented in problem sets.

(*) Online Interactions
If you have questions about the course, we are here to help! However, please follow these guidelines to streamline issues that may arise outside of class and office hours:

- **Administrative issues/concerns** (OAE accommodations, emergencies requiring an extended absence, etc.) should be directed to me (Dr. Schaeffer), by email.

- **Questions about course material** (e.g., on homework or examples from lecture/discussion) should be submitted via the Online Q&A webform—I will answer these questions once weekly (probably Wednesday afternoon), in PDF form. Please do not email such questions to the course staff! Believe me, it’s better this way for all of us.

- If you notice a *typographical (or mathematical) error* in a file, please email me (Dr. Schaeffer) immediately—don’t be shy, I make these fairly often.

- Emails received outside of regular work hours (9 AM–5 PM, Mon–Fri) will naturally receive replies at a slower pace. Please remember that we also have personal lives and responsibilities outside of this class! :)

Problem Sets
The problem sets in this class are of central importance and will generally be rather long. In addition to asking you to demonstrate what you’ve learned so far, problem sets will develop new material, and they will assist you in developing and practicing your proof-writing skills.
Your assignments will therefore be evaluated based not only on completion and correctness, but also on how well you communicate what you are doing. **It is a very, very good idea to start the problem sets early.**

There will be a total of eight graded problem sets during the course. These will be submitted via an online service called Gradescope (more details to come), due by Noon on Friday of every week. Late assignments will be accepted up to one day after the due date, but will receive a penalty at the instructor’s discretion.** Solutions will be posted to the course website after the late submission deadline has passed.

Collaboration on problem sets is permitted as long as it is beneficial to your understanding of the material. **Copying someone else’s homework is a violation of the Stanford Honor Code;** your solutions must be your own.

Your lowest score on a problem set will be dropped, provided you submitted Problem Set 0. This policy is in place is to accommodate any emergencies that prevent you from submitting your work on time; you are still responsible for the material contained in the assignment, and you should not use it to "skip" an assignment.

A nominal amount of extra credit will be given to those students who elect to submit their problem sets as a PDF produced using LaTeX.

**Examinations**

There will be two exams during this course:
- Midterm Exam: Administered in class on **Tuesday, May 8th, in class.**
- Final Exam: Administered on **Friday, June 11th, 12:15–3:15 PM.**

The Final Exam will be cumulative but will emphasize material covered after the Midterm Exam.

Students with accommodations from the OAE must make arrangements with Dr. Schaeffer for each exam (with notification at least one week prior to the exam date), and Dr. Schaeffer must have received your letter from the OAE before the accommodated exam is administered.

**Make-up exams will not be given.**

**(**) Late and Make-up Work Policies

The general rule is that homework assignments turned in more than a day after the due date are not accepted and make-up exams are not given. Exceptions are guaranteed only for students with planned religious observances who inform me (Dr. Schaeffer) well in advance.

Please notify me immediately by email if there is any situation that will interfere with your work in this class, and we can discuss our options.

**Determination of Grades**

Your numerical grade will be partitioned according to the following scheme:
- Problem Sets: 35%
- Midterm Exam: 25%
- Final Exam: 40%

Once numerical grades have been computed, letter grades will be assigned according to an impartial and nonnegotiable scale to be determined.