

MATH 360: Advanced Calculus

Please read this syllabus carefully and thoroughly.

Time and place. TR, 1.30pm - 3 pm, David Rittenhouse Lab 4C6

Instructor. Andrew A. Cooper, ancoop@math.upenn.edu

TA. Shi Gu, gus@sas.upenn.edu

Office hours. 3N4A DRL, MW 2 pm - 3 pm and by appointment

Website. <http://www.math.upenn.edu/~ancoop/360>

Text. Walter Rudin, Principles of Mathematical Analysis

Equipment. No calculators. PDF- and Internet-capable device. Coffee may come in handy.

Overview. In this course, we will explore the theoretical underpinnings of the classical calculus you have already learned. In contrast to previous courses you have had, we will not focus on computation, but instead on proving the familiar theorems upon which calculus runs. We will encounter a number of new objects, and we will also catch some old objects behaving badly. My plan is to cover roughly chapters 1–7 of the text.

A successful student in this course will learn about the basic objects of real analysis and how to think and communicate about them.

Prerequisites. The formal prerequisite is MATH 240. I highly recommend you take one of MATH 202 or MATH 203 as a pre- or corequisite. This is a heavily proofs-based course, and I will not spend too much time explicitly teaching proof techniques.

The Text, the Lecture, and Homework. Rudin is a famously terse text. Passively reading it will not gain you much in the way of intuition or insight. It will be my goal in lecture to motivate the definitions and major proof ideas, as well as supplying a number of worked-out proofs of important results. The homework exercises will be selected to make you think hard about the material in the text. Very often I will ask you to prove an important theorem, which we will use later on. Sometimes I will leave theorems for you to read on your own. I highly recommend you read with a pencil and paper on hand.

Evaluation. Your course grade is based solely on your performance on the following graded materials:

- 49% homework.
- 10% blogging assignment.
- 20% mid-term exams.
- 20% final exam.

Homework. Homework will be assigned weekly and will consist of some book exercises and some other problems. You will have one week to complete each homework assignment. Homework will be distributed electronically via PDF; make sure you can receive and read PDF files. 80% of your homework grade will be based on your written answers. 20% will be based on your participation in the lab section. Homework will be due every Friday at 4.30pm, in my mailbox in the math department office.

For my sake and that of our TA, Mr. Gu, concision should be your goal. If you can, please type your written assignments. If you plan to go on to a career in mathematics, physics, engineering, economics, computer science, etc., the ability to produce good-looking typed math will be very useful. Talk to Mr. Gu or me to get pointed in the right direction.

Lab sections. Please attend the lab section in which you are enrolled.

The lab section will give you an opportunity to ask questions about the current class material. A portion of the lab section will be reserved for you to present your homework solutions after they have been turned in. Everyone will have to present, and everyone should participate by asking questions of the presenter, &c.

A more detailed description of the presentations can be found on the course website.

Blogging assignment. You will participate in our class blog by making one post every two weeks and commenting on two posts each week.

A more detailed description, as well as technical details on how to create an account for the blog, is posted on the course website.

Exams. There will be two mid-term exams. The first will be an in-class exam on 14 February. The second will be a take-home exam in early April, which you will have a week to complete.

The final exam will also be a one-week take-home exam.

Group work and credit. Take credit only for your own work. Study groups and discussions of homework assignments are encouraged, but any work turned in with your name on it must be written solely by you. In addition, *if you work in a group or seek help from an outside source, please provide a list of all sources you consulted, including the names of any fellow students.*

Homework is used in evaluation, but its primary goal is to get you to wrestle with ideas. In this course, you will learn far more from homework than you will from lecture. For this reason, I encourage you to work on the problems alone first—before you consult others or outside sources such as other textbooks or the internet.

For take-home exams you will only be allowed to use the text and your class notes; you will not consult your fellow students, other books, the internet, &c. I will ask you to sign a statement to this effect when you turn in your exam. The penalty for collaboration on take-home exams is at my discretion, but may include invoking the University's policies on academic dishonesty.

Excuses. Let me know as soon as possible if you have religious holidays, athletic trips, &c. that will prevent you from turning in your work to be evaluated. In case of emergency, do your best to contact me as soon as you can. I will be the sole arbiter of what constitutes a valid excuse from class work.

The One Percent. Please make sure you understand this syllabus. If you have any questions regarding course policies or this syllabus, please put them in a note, sign and date it, and bring it to class on Tuesday, 15 January. If you have no questions, please write a statement to that effect, sign and date it, and bring it to class on Tuesday, 15 January. This will constitute the as-yet-unaccounted-for 1% of your grade.

If for any reason your note is submitted after class on Tuesday, 15 January, you will receive half credit.