

**MATH 207 – HONORS REAL ANALYSIS IN  $\mathbb{R}^n$**   
**FALL 2023**

THE COURSE

Welcome to Math 207. This course is an in-depth introduction to real analysis and multivariable calculus.

CONTACT INFORMATION

Lecturer: A. Wilkinson, wilkinso@uchicago.edu, Eckhart 410.

College fellow: Brin Harper, bcharper@uchicago.edu, E4 on Ryerson 4th floor (office hour location TBA).

SCHEDULE

Lecture MWF 10:30–11:20, Eckhart 206

Problem Session time, location TBA

TEXT

Our text is Charles Pugh's *Real Mathematical Analysis*. It is available free online to uchicago account holders through the Springer link: <https://link.springer.com/book/10.1007/978-3-319-17771-7>. I do not recommend buying it through Amazon – you will get a reprinted “on-demand” copy with horrible graphics.

A supplementary text, a classic, is Walter Rudin's *Principles of Mathematical Analysis*. I will put an (old) .pdf copy on the canvas website. Pugh's book closely tracks Rudin's (his book grew out of lecture notes from teaching Rudin), and you are absolutely encouraged to consult Rudin if you'd prefer a more straightforward approach to the subject: it's all there. Where, in my mind, Rudin goes off the rails somewhat is in his treatment of differential forms. We will not cover it in this quarter, but Pugh's approach to Lebesgue integration is lovely and perhaps worth revisiting when you learn Lebesgue Integration in later quarters (or even if you don't).

PREREQUISITES

By admission only (and to be clear: I'm not the one who does the admitting). To succeed, you should have a solid foundation in one-variable calculus and have a reasonable comfort level with proof (which will improve over the course of the year). If you have not yet taken Linear Algebra, you must take it this quarter. Linear algebra is essential to multivariable calculus. I would say “a love of math” is a prerequisite, but frankly, I don't even love math all the time. Maybe just have an interest and curiosity about it. In fact, I'll go on record that curiosity is a prerequisite.

## HOMework AND WORKING GROUPS

Problems sets will be assigned weekly. *Homework will be due Wednesday night, online. Brin and the grader will give more detailed instructions.* Late homework **cannot be accepted without prior arrangements**, and only **under special circumstances**.

You are strongly encouraged to discuss homework problems together; it's one of the best ways to learn to do mathematics. In fact, we will be assigning working groups, and you will be required to meet with your group for the first two psets. (You are free to work with other people in addition to your working group).

However, each student must write up the homework individually, in their own words rather than merely copying someone else's. Please write the name of the people you work with on your homework, including members of your working group.

## EXAMS

Midterm 1: Monday, October 30, in class.

Final: Will post when I have the information.

Please note that makeup midterm exams are only given for unforeseeable circumstances beyond the student's control. In particular, schedule conflicts are not an acceptable reason: please let me know about any schedule conflicts as soon as possible. Department policy prohibits giving final exams early.

## GRADING

40% Homework  
25% Midterm  
35% Final Exam

## HELP

My office hours will be on Tuesdays, 4-5:20 pm, over Zoom. You may make also an appointment to see me if you want to discuss the material in class. Just send an email.

Brin's office hours: TBA

## SYLLABUS

We will cover the following topics: Construction of real numbers, metric space topology, real-valued functions and function spaces, and multivariable calculus (differentiation, implicit and inverse function theorem, the rank theorem, Lagrange multipliers and optimization, multiple integration, differential forms, including Stokes's theorem and its sequelae).

## ONLINE RESOURCES

- (1) The Canvas website. This is the main online resource, where we will post announcements, psets and solutions, etc. You will find the Zoom link to my office hours there. Here is the link: <https://canvas.uchicago.edu/courses/52599>
- (2) Discord server. You need a (free) discord account to use this. This is a good place to discuss lectures and psets. Here is the link: <https://discord.gg/hpNJ5Suz>