

MAT320: INTRODUCTION TO REAL ANALYSIS

Fall 2024

Instructor:	Semon Rezhikov	Time:	Tu Th 1:30 – 2:50
Email:	semonr@princeton.edu	Place:	TBA

Description: Introduction to real analysis, including the theory of Lebesgue measure and integration on the line and n -dimensional space. Applications of measure theory and the Lebesgue integral to other topics such as introductory probability theory and functional analysis.

Students are expected to have some familiarity with mathematical proofs. We will aim to approach the topic in a rigorous manner. However, the course will not be as difficult as MAT 425, which covers roughly the same material.

Course Pages: <http://www.rezhikov.me/mat320>, Canvas.

Office Hours: Tuesday after class, and Thursday 10am — 11am, or by appointment, in Fine 609.

Contacting me: Please email semonr@princeton.edu and put MAT320 in the subject.

Textbooks:

- (Primary) Royden and Fitzpatrick, *Real Analysis*, 4th Ed, Pearson, 2010.
- (Optional) Stein and Shakarchi, *Measure Theory, Integration, and Hilbert Spaces*, PUP, 2005.

Prerequisites: MAT 201 and 202 or equivalent. We will assume a level of familiarity with proofs. We will be reviewing material equivalent to MAT215 very quickly during the first few weeks of class.

Outline: We will begin by studying Chapters 1-6 in Royden and Fitzpatrick, and afterwards explore more advanced topics discussed throughout the book, as time permits.

Grading Policy: Problem Sets (30%), Quizzes (20%), Midterm (20%), Final Exam (30%).

Problem sets: Posted Thursdays, due in at the beginning of class on subsequent Thursdays. You may work with other students on the problem sets but you must write up your own solutions. Late assignments will not be accepted. The lowest two problem set grades are dropped.

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Quizzes: There will be two in-class quizzes, one on September 19 and one on November 7th (chosen to be the day before the deadline for dropping the class.)

Midterm: In class on October 10.

Final Exam: The final exam date will be set by the course registrar. It will be a timed take-home final, to be submitted online.

Attendance Policy: There will be no formal enforcement of attendance, except for the following. *You must hand in homework in person at the beginning of class on Thursday, and you must take the quizzes and midterm in person.* Regular attendance is essential in order to understand the material. If you must

miss the quiz days or the midterm day for any reason, please email me in advance so that I can try to make alternative arrangements for you to take the tests. Please see the University Policy on attendance <https://ua.princeton.edu/policies-resources/academic-regulations/academic-year>.

Collaboration Policy: You are welcome (and encouraged) to collaborate with other students currently taking the class on all problem sets. However, *you must write up all of your own work*. There is no collaboration during exams and quizzes.

Generative AI Policy: Feel free to ask Generative AI any mathematics questions while studying or when doing your problem sets. However, you must write up your own work. Treat Generative AI like you treat any other student taking the class. During tests and quizzes, use of Generative AI is not allowed, just as use of calculators will not be allowed.

Office of Disability Services (ODS) accommodations: Please inform me in person of any ODS accommodations that you may have. I require the formal note from the ODS office before making any accommodations.