

Course Syllabus

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Welcome to Math 419/545, Probability II

Instructor: Jonathan Hermon

Lectures: MWF 10:00 – 11:00 am.

Office hours: M 11:00 - 12:00 and F 12:00 am – 1:00 PM in-person (office: Math 114).

Final Exam date, time and location: TBA.

Textbook: I'll mostly follow the book *Probability: Theory and Examples* (version 5) by Rick Durrett, and for some parts [Lecture notes](#)[Links to an external site.](#) by Perla Sousi from the course Advanced Probability at Cambridge. Durrett's book is available online for free at <https://services.math.duke.edu/~rtd/PTE/pte.html>[Links to an external site.](#)

Other references of interest are:

- D. Williams, *Probability with Martingales*, Cambridge University Press 1991.
- P. Mörters and Y. Peres, [Brownian motion](#)[Links to an external site.](#), Chapters 1,2,3,5, Cambridge University Press 2010.
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Prerequisites: Math 418/544

Piazza: This is an online discussion board where you may post questions and look for teammates to help understand the material. Students are encouraged to address student questions – this is meant to be a collaborative space. You may ask for help with homework questions, and while hints may be given, solutions should not be. Significant contributions on Piazza will be rewarded grade-wise. A rule of thumb is that if your question is of interest to other classmates it is better to post it on Piazza than ask it via email. If you do email me, please do so via Canvas.

Reading: You are encouraged to look at the relevant part of the textbook/notes before lecture, keeping an eye out for concepts that you don't understand which can be clarified in lecture.

Written homeworks: There will be 5 or 6 homework assignments. You would usually have two weeks to work on each assignment. Solutions should be submitted as a **single** file through canvas. Solutions will be graded both on accuracy and quality of exposition. Solutions should be mathematically rigorous, well-crafted, and written in

complete English sentences. Solutions must always be legible; use of LaTeX is encouraged and appreciated, but is not mandatory.

Beyond extreme circumstances, apart from a two hours grace period, late homework will not be accepted. The lowest homework score will be dropped.

If you are auditing the course officially (for an AUD standing) you need to submit solutions to all assignments but one, and submit solutions to strictly more than 50% of the questions for each assignment.

Grading scheme:

Homework: 60% (lowest graded assignment dropped)

Final exam (or take home exam - TBA): 40%.

Academic integrity: Students may work together to understand the problems, but are expected to write their solutions independently. No two homeworks should look identical. Students may research concepts online, but may not use solutions which are found online. If your solution is based on joint discussions with other students or on online sources, specify this on your submission.

Outline: This course is a continuation of Math 418/544. Together they give a comprehensive introduction to measure theoretic probability which should be ideal for those wishing to study probability, or use it as a tool in analysis, statistics, mathematical biology, economics, finance or applied mathematics. The course will be based on Chapters 4, 5 and 8 of Durrett, with additional topics as time permits. The main topics are:

1. Martingales
2. Markov chains
3. Brownian motion"