

**Instructor:** Omer Angel.

**Contact:** angel@math.ubc.ca

**Lectures:** M-W-F 10:00-10:50 at Math 103.

**Course webpage:** <http://www.math.ubc.ca/~angel/probab>

**Office hours:** Math annex 1210, Monday 12:00-13:00, Friday 9:00-10:00 or by appointment.

**Text:** *Probability Theory: A Comprehensive Course* by Achim Klenke, Springer 2006.

### Course outline:

Together with Math 418/544 in term 1, these courses give a comprehensive introduction to (mathematically rigorous) probability theory for graduate students and math honours undergraduates. The course is intended to be useful for those who use probability as a tool in other fields, or planning to do research in probability. (Probability theory has applications in analysis, statistics, finance, applied mathematics, combinatorics and number theory and has ties to many other fields.)

This course will build on some of the notions from term 1. In particular, probability spaces and random variables, as well as expectation and conditional expectation will be used frequently. Other topics will be used as needed.

Topics in term 2 include the following: Markov chains and their analysis: recurrence, transience, stationary measures and distributions, mixing times and Markov chain Monte-Carlo; Poisson processes; Brownian motion: Definition, construction, properties; Ergodic theory, and many applications.

**Further Reading.** There are many written resources. a few textbooks that cover much of the course material:

R. Durrett. *Probability: Theory and Examples*.

D. Williams. *Probability with Martingales*.

P. Billingsley. *Probability and Measure*.

O. Kallenberg. *Foundations of Modern Probability*.

D W. Stroock. *Probability Theory. An analytic view*.

K L. Chung. *A course in probability theory*.

L. Breiman. *Probability*.

**Evaluation:** Homework (50%): There will be roughly weekly assignments. You are encouraged to work on problems with other students, but must submit your own solutions. Take home exam (50%), in April. Grades are usually scaled. The assignments and exam will be common for 419 and 545 students, though expectations and scaling applied may differ.