MATH 418/MATH 544: Probability I

Instructor: M. Barlow
Office: Math. Annex 1209
Time: MWF 10.00
Room: MATH 202
Office hours: to be announced
Course webpage `www.math.ubc.ca/∼barlow/m418`

Text: R. Durrett. Probability: Theory and Examples, 4th ed.

Outline. Together with Math 419/545 in Term 2, this course 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, as well as those 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.)

A background in measure theory (e.g. Math 420) is not strictly required, and the requisite notions will be introduced in class. Some results from measure theory will be stated without proofs. However, familiarity with the basic concepts of measure theory will be useful to in order to derive the full benefit from the course. If you meet measure theory here for the first time, it may be a lot to take in at once.

Topics in Term 1 include the following: Probability spaces, random variables, expectation and moments, modes of convergence, independence, the Borel-Cantelli Lemma, Kolmogorov 0-1 Law, characteristic functions, weak convergence, the law of large numbers and central limit theorem. Random walks, stopping times, conditional expectation, martingales, as well as applications.

Prerequisites: 68% in Math 321, or equivalent.

Grading: Homeworks 40%, midterm (on Wednesday October 18th) 20%, final exam 40%.

You may find it useful to discuss and work on homework problems with other students, but you should write the solutions on your own.

Further Reading. There are many books which cover roughly the same material. The following may be useful:

A. Klenke. Probability Theory: A Comprehensive Course.
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.

Version 24.8.17 draft. Please check course webpage for updates.