Class hours: Mon-Wed-Fri. 11:00–12:00.
Office hours: Mon-Fri. after class, or by appointment.
Contact: Math annex 1210, 604.822.6532 angel@math.ubc.ca
Course website: www.math.ubc.ca/~angel/548

Course Outline

We will discuss some of problems and modern tools of discrete probability. Topics will be some of the following:

1. Random walks: their relation with electrical networks, Green’s function, harmonic potential.
4. Ergodic theory: Birkhoff’s and mean ergodic theorems, recurrence theorems, applications (van-der Waerden’s and Szemeredi’s theorems).
5. Percolation: Russo-Seymour-Welsh technology, the Harris-Kesten theorem, critical and off-critical behaviour, conformal invariance (Smirnov’s theorem).
6. Introduction to statistical mechanical models: The Ising, Potts, hard core models and dimers.

Prerequisites

You should be familiar with basic probability and Markov chains. For maximal benefit, students should have some knowledge of measure theory, and Martingales.
Evaluation

The grade will be based on assignments throughout term; they will normally be due one to two weeks after the relevant topics are covered in class.

- You are encouraged to collaborate in solving the problems, and should indicate on your assignments who you collaborated with. However, each student must write their solutions independently. You may (and should) share your ideas but you may not share your written work.
- Late assignments will not be accepted for credit.

Textbooks and References

There is no single book that covers all parts of the course well. The following cover various aspects of the course, and can be used as references.