Problems in Applied Probability

For many real-world processes, like financial market prices, molecular motion and weather patterns, seemingly random fluctuations are intrinsic to the observed behaviour. Understanding the uncertainty in such systems requires a knowledge of the probabilities by which they are ruled, and the statistics by which we can measure them. This plan for this course is to introduce the basic mathematical tools for quantifying the probabilities and statistics of random systems, and to apply these ideas to models with uncertainty. Computational approaches to random simulation and parameter estimation will play an prominent role in the lectures and assignments.

The first part of the term will be an introduction to the mathematics of probability, and the statistics of randomness. The second part of the term will focus on specific problems, and their analysis using probabilistic and statistical methodologies. Assignments will be problem-based, and also require some use of the Matlab computing environment. Possible special topics are: queueing theory, stochastic differential equations, and data assimilation.

Prerequisites: math 310 & macm 316 or stat 280; or instructor's permission

Textbook: *Introduction to Probability Models*
     Sheldon Ross, Academic Press, 8th ed (2003)

Tentative Grading: assignments (45%), midterms (25%), final exam/project (30%)