Stat 322: Markov Processes

Instructor: Amarjit Budhiraja

Time: Spring 2004, Monday, Wednesday 2.00-3.15 pm

Place: New West 107

This course will cover the fundamentals of the theory of Markov processes in continuous time. The topics that will be covered in the course (not necessarily in that order) are as follows.

1. Wiener process, Poisson process and other continuous time martingales.
2. Stochastic Differential Equations(SDEs) and Jump-Diffusion Processes.
3. Some key results from the *Theory of Weak Convergence* for processes with paths in $D[0, \infty)$.
4. Basic ingredients of Markov processes: Infinitesmal generator, transition probability semigroup, Hille-Yosida theorem, strong Markov property.
5. Martingale problems and weak solutions of SDEs.
6. Diffusion approximations. Convergence of discrete time Markov chains to continuous time Markov processes.
7. Asymptotic results from the theory of Markov processes: transience, recurrence, invariant measures, ergodicity, stability, averaging results.
8. Basics of controlled Markov processes: Dynamic programming principle, Bellman equation.
9. Motivating applications from Genetics, Biology, Stochastic Networks, Mathematical Finance, Nonlinear Filtering will be scattered all over the course.

Prerequisites for the course are Measure Theory (Stat 154) and Measure Theoretic Probability (Stat 155). For more details please contact the instructor at: `budhiraj@email.unc.edu`.