Statistics 531: Probability Theory

Professor J. Michael Steele

PREREQUISITES. This course is designed for graduate students in Statistics, OPIM, mathematics, applied mathematics, and related fields. Student are expected to have a firm knowledge of real analysis including some familiarity with Lebesgue integration. The course also assumes solid familiarity with complex analysis and linear algbra at least at the level of a good undergraduate course. Knowledge of probability theory at the level of Statistics 530 is also required.

COURSE OBJECTIVES. This course is a continuation of Statistics 530. The level and extent of the course is well captured by the second half of the text: *Probability:Theory and Examples (Fourth Edition)* by Rick Durrett. There will be supplemental material on Markov Chain central limit theory and on Markov Decision Problems.

SPECIAL EMPHASIS ON PROBLEM SOLVING. The course will give much attention to problem solving and stochastic processes as a creative endeavor.

COURSE TOPICS:

- Martingales
- Renewal Theory
- Random Walks (and Stopped Random Walks)
- Poisson Process in d-dimensions
- Branching Processes
- General Markov Chains in discrete and continuous time
- Stationary Measures and Limit Theory (Spectral Theory)
- Markov Chain CLT
- Markov Decision Problems
- Introduction to theory of stationary processs
- Introduction to Brownian Motion
- Concentration of Measure Phenomena
- Probabilistic Methods in Combinatorics

TEXT, POLICIES, ETC.

Texts: *Probability:Theory and Examples (Fourth Edition)* by Rick Durrett

Homework: Regular homework will be assigned and graded.

Grading: Grades are based on the homework (35%), midterm (15%) and a final exam (50%).

Auditors: Auditors are welcome. Homework by auditors will not be graded.

MORE INFORMATION?

Office Hours: Please see Steele's personal web page for current contact information.

Still More?: Google Steele Stat 531 for the Course Blog.