Statistics 110 – Introduction to Probability – Summer 2006

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Office Hours: Tuesday 12:00 – 1:00,
Thursday 12:00 – 1:00,
or by appointment

Objectives

This is a comprehensive introduction to calculus based probability. Basics: sample space, conditional probability, Bayes Theorem. Univariate distributions: mass functions and density, expectation and variance, binomial, Poisson, normal, and gamma distributions. Multivariate distributions: joint and conditional distribution, independence, transformation, multivariate normal and related distributions. Limit laws: probability inequalities, laws of large numbers, central limit theorem. Monte Carlo (simulation) methods. Markov chains: transition probability, stationary distribution and convergence.

Prerequisites

Mathematics 21a or equivalent required, concurrent Mathematics 21b or equivalent recommended.

Lectures

Monday - Friday, 11:00 – 12:00, Science Center 109

Sections

Monday, 1:00 – 2:00, Science Center 109

Required Text

Rice, JA (1994) Mathematical Statistics and Data Analysis, 2nd Edition. Duxbury Press.

Optional Reference

Ross S (1994). A First Course in Probability, 6th edition. Prentice Hall

Grading:

Homework (25%)

Homework assignments will be posted on the course page, in addition to being distributed in lecture. Please show work supporting your answers. Correct answers without supporting work will not receive credit. There will be 6 or 7 assignments in total. Homework is due at the beginning of class on the due date. Late homework will not be accepted. Since we understand that from time-to-time your schedule may not allow you to turn in your homework on time, your lowest homework score will be dropped when computing your final grade.

Quizzes (15%)

There will be two 30 minute quizzes during the term. The tentative dates are Tuesday, July 11th and Wednesday August 2nd.

Midterm (20%)

Thursday, July 20th, in class (Tentative)

Final Exam (40%)

Wednesday, August 16th, 9:00 am. Location to be announced in late July.

Lecture Schedule (Tentative)

Week	Suggested Reading	Topics Covered
June 26 – June 30	Chapter 1	Sample space, basic laws of probability, conditional probability, Bayes theorem, independence
July 3 – July 7	Sec 2.1, 2.2, 4.1, 4.2	Discrete and continuous random variables, expectation, variance
July 10 – July 14	Sec 2.3, 3.1 – 3.6	Functions of a random variable, joint distributions, conditional distributions
July 17 – July 21	Sec 3.7, 4.3 – 4.5	Extreme values and order statistics, covariance, correlation, conditional expectation and prediction, moment generating functions
July 24 – July 28	Sec 4.6, 5.1, 5.2, Chapter 6, Handouts	Inequalities, approximate methods, delta method, laws of large numbers, distributions related to the normal distribution
July 31 – Aug 4	Sec 5.3, 7.1 – 7.3, Handouts	Convergence in distribution, central limit theorems, simple random sampling,
Aug 7 – Aug 11	Sec 7.4, 7.5, Handouts	Ratio estimation, stratified random sampling, simulation (Monte Carlo) methods , Markov chains: transition probabilities, classification of states, stationary distributions, convergence results