September 1, 2010
Probability and Statistics
Fall 2010

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Course Outline

September 1. Sample Space, Events, Random Variables, Basic Rules of Probability, Expectation and Games of Chance, Simulation (Chapter 3)
September 8. (No class - Monday classes meet)

September 15. Bayes Rule, Moments, Discrete Univariate Distributions, Permutations and Combinations (Chapter 3 & 4)
September 22. Discrete Univariate Distributions (Chapter 5)
September 29. Exam 1. Continuous Univariate Distributions (Chapter 5)
October 6. Continuous Univariate Distributions (Chapter 5)
October 13. Sampling, Sampling Distributions, Law of Large Numbers, Central Limit Theorem and Confidence Intervals (Chapter 6)
October 20. Hypothesis Testing (Chapter 6)
October 27. Exam 2. Parameter Estimation: Method of Moments, Maximum Likelihood, Bayesian (Chapter 7)
November 3. Parameter Estimation: Method of Moments, Maximum Likelihood, Bayesian (Chapter 7)
November 10. More Confidence Intervals and Hypothesis Testing (Chapter 8 & 9) Multivariate Distributions (Chapter 5)
November 17. Exam 3. Multivariate Distributions (Chapter 5)
November 22 (Monday). Goodness of Fit Tests (Chapter 10)
December 1. Cumulative Sum Statistics (CUSUMs), Markov Chains
December 8. Markov Chains
December 15. Reading Period, No Class
The material in Chapters 1 and 2 will be covered as the associated applications arise. We may not be able to cover all the topics listed in the syllabus. We will see what happens as the semester progresses. The material to be covered in each exam will be announced during the class immediately preceding the exam.

Two major topics are introduced that are not found in the textbook. These are Bayesian estimation methods and Markov chains. Cumulative sum statistics are also introduced but only as an application of Markov chains.

Regression and analysis of variance (Chapters 11 and 12) are covered in Linear Models and will not be presented here.

Course Objectives: Probability and statistical methods are used by virtually every major corporation and are essential to most research projects. You will be exposed to this material over your career. It is important that you have an understanding of basic techniques. This course will present introductory topics in probability and statistics, and foster analytical thinking. A peripheral objective of the course is to teach fundamental R programming. Although not explicitly stated in the syllabus, R will be used regularly during the course. Limited R programming will be required on the exams. More advanced R programming will be required on selected homeworks.

Homework will be assigned after every lecture. The assignment will be discussed at the beginning of the next class. Please spend time on the homework problems before class; otherwise, you will get little out of the discussion. Selected assignments will be grading. These will be announced. The graded assignments will be 20% of your grade and will be discussed after grading. You can communicate with anyone to receive help in doing the homework. There is a difference between collaboration and copying.

Each exam contributes 20% to the final grade. The exams are designed for approximately half of the class period (same is true of the final). All exams will be in class with open notes but closed book. You will need a laptop with R. During the exam you will have access to any material stored on your laptop.

“I pledge, on my honor, that I have neither received nor given any unauthorized assistance on this examination (assignment).”
(http://academicintegrity.rutgers.edu/integrity.shtml)