Course 6203: Applied Probability

Fall 2009

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Office Hours: Monday and Wednesday: 11:00 – 12:30 am, 3:30-5:30pm
Any change in office hours will be notified in class.

Course Number: MATH 6203

Course Title: Applied Probability

Hours Credit: 3 hours

Prerequisites: MATH 1634 or MATH 2063 or equivalent

Topics: Topics include probability counting methods, discrete and continuous random variables and their distributions, expected value, sampling distributions, Central Limit Theorem, and normal approximation to the binomial


Syllabus

1 Probability
   1.1 Introduction
   1.2 Set Theory
   1.3 The Probability Set Function
   1.4 Conditional Probability and Independence
   1.5 Random Variables
   1.6 Discrete Random Variables
   1.7 Continuous Random Variables
   1.8 Expectation of a Random Variable
   1.9 Some Special Expectations

2 Multivariate Distributions
   2.1 Distribution of Two Random Variables
   2.2 Transformations: Bivariate Random Variables
   2.3 Conditional Distributions and Expectations
   2.4 The Correlation Coefficient
   2.5 Independent Random Variables
3 Some Special Distributions
   3.1 The Binomial and Related Distributions
   3.2 The Poisson Distributions
   3.3 The Gamma, Chi and Beta Distributions
   3.4 The Normal Distribution
   3.5 The Multivariate Normal Distribution
   3.6 The t and F Distributions

4 Unbiasedness, Consistency, and Limiting Distributions
   4.1 Expectations of Functions
   4.2 Convergence in Probability
   4.3 Central Limit Theorem

5 Some Elementary Statistical Inferences
   5.1 Sampling and Statistics
   5.2 Order Statistics
   5.3 More on Confidence Intervals
   5.4 Introduction to Hypothesis Testing
   5.5 Chi-Square Tests
   5.6 The Method of Monte Carlo

6 Maximum Likelihood Methods
   6.1 Maximum Likelihood Estimations
   6.2 Rao-Cramer Lower Bound and Efficiency
   6.3 Maximum Likelihood Tests
   6.4 EM Algorithm

8 Optimal Tests of Hypotheses
   8.1 Most Powerful Tests
   8.2 Likelihood Ratio Tests
   8.5 Minimax and Classification Procedures

Grading:

Final Marks = 30% Quizzes/Homework + 40% Tests + 30% Final Exam

Grading Scale:

• A = 85% to 100%
• B = 70% to < 85%
• C = 55% to < 70%
• D = 40% to < 55%
• F = below 40%
There will be either a quiz or homework due in class every week.
Test dates will be announced in class a week in advance.
Final Exam: Monday, 7th December 2009; 5:30-7:30pm

Class Policies:

- You get to drop TWO of your quiz/homework grades.
- The final exam is COMPULSORY and COMPREHENSIVE for everyone.
- There are NO other extra credits available for this course.
- There are NO make up tests. In case of an illness (with medical certificate) or dire emergency, the instructor must be contacted prior to the test or quiz, via phone or email. Accommodations for missed tests and quizzes will be handled depending on the severity of the situation between the student and the instructor.
- If you need to arrive late or leave early, please clear it with the instructor BEFORE the class begins.
- Cheating of any sort will not be tolerated. If you are found cheating or assisting in any form of cheating, you will be awarded a failing grade in that test or quiz.
- Turn off cell phones and other devices when you enter the classroom.
- If using email, you must use your university email account (@westga.edu) for any communication; also check your university email account for any announcement regarding the class.
- You can come and see me during my office hours or by appointment. Please feel free to come and talk to me about any problems related to the course.