CourseNo: SIEOW4150_001_2012_3
Meeting Location: SEELEY W. MU 535
Meeting Time: MW 11:40A-12:55P

Instructor Information:
Guillermo M. Gallego

Office Hours Professor Gallego: Tuesday 3-4pm @ 820 CEPSR.
Office Hours Anran Li (al2942@columbia.edu): Monday from 4:30-5:30pm @ 351 Mudd Bldg.
Office Hours Fahad Saleh (fs2459@columbia.edu): Tuesdays 12:00-1:00pm @ 351 Mudd Bldg.

Course Assistant Prabhu Lokesh (lp2480@columbia.edu)

Recitations: Fridays from 3-4pm Room Mudd 535.

Prerequisites: The course requires one year of calculus and a certain degree of mathematical maturity.

Motivation

Why study probability and statistics? One answer, of course, for many of you is that this is a required course. But why? The reason is that we live in a world where uncertainty is everywhere. Will it rain tomorrow? Which candidate will win the elections? Is treatment A better than treatment B? Is production out of control? Should we target generation Y instead of generation X? While we cannot give a definitive answer to most of these questions, we can observe the underlying process, collect data and give an answer couched in probabilistic terms. Thus, we may say that there is an eighty percent chance that it will rain tomorrow, and we may reject the claim that treatment A is better than treatment B and at the same time announce the probability that we are wrong. In general, in statistical inferences we collect data and want to make intelligent and rigorous statements about a population from which the data comes from. Examples include polling, quality control, medical treatments, risk-management, etc. Data are subject to statistical variations, and we want to use data to reach fairly reliable conclusions despite of the statistical variations of the data. Thus statistical statements are couched in terms of probabilities and therefore we need to study probability to understand statistics. However, the study of probability is interesting in itself. It prepares students for courses in stochastic processes, simulation, quality control, reliability, risk management and adds to their understanding of random phenomena.

Course Objectives

The course is given at an intermediate mathematical level. This is an ambitious course as we cover both probability and statistics in one semester. Topics to be covered include Probability Axioms, Sample Spaces, Conditional Probability, Independence, Random Variables, Discrete and Continuous Distributions, Joint Distributions, Conditional Expectation, Law of Large Numbers, Convergence in Distribution, Central Limit Theorem, Sampling, Parameter Estimation, Confidence Intervals, Test of Hypothesis, Goodness of Fit, Linear Regression.

Because so much material is covered, it is impossible to go over a large enough number of examples that illustrate the subject as it is being developed. Therefore, students should expect to spend at least five hours a week reading the book, reading the references, and going over the book examples, the recommended problems, and the assigned problems. There will be weekly recitation sessions where the TA will go over questions and exercises.
It is very important not to fall behind because the material builds up very quickly. On the positive side, the reward is that after one semester you will have a working knowledge of probability and statistics.

**Method of Evaluation**

Assignments (15%), one midterm (40% to be held on Wednesday October 17), and final (45%). Both the midterm and final exams are closed text and closed notes. You can bring one (1) two-sided 8.5" by 11" sheet with formulas and a calculator to the midterm and two sheets to the final. After taking the final exam, the grade for the midterm will be adjusted to the maximum of the original midterm grade and the final grade. Thus, a student who earns a grade of 65 in the midterm and 72 in the final will have his midterm grade adjusted to 72. A student who earns a 72 in the midterm and a 65 in the final will keep the 72 grade for his midterm. There will be no make up for the midterm. Students who miss the midterm will have the final grade as the midterm grade. Thus a student who misses the midterm and obtains a grade of 72 for the final will have a 72 as the grade for the midterm. I do not offer an alternative date for the final exam for students who have class conflicts the day of the exam. If you have a conflict, talk to your other instructors or take my class in a different semester. I will only consider giving the final exam at a different date under truly extenuating circumstances. All examinations and written homework are subject to the usual standards of academic honesty as described in the University's Student

Throughout the semester, you will have a total of five grace days. You can use these grace days to turn in your homework assignments late. You will not be penalized for late homework assignments as long as you do not exhaust your grace days. Once you exhaust your grace days though, 50% penalty per day will be applied on your late assignments. That is, a two-day late homework assignment that deserves a grade of 80 will get a grade of 20. Please use your grace days wisely. No extensions beyond the grace days will be granted.

We will not adopt the policy of dropping the lowest homework grade.

**Resources**


Reference Text: Bernstein, Peter L. Against the Gods, Wiley 1996
