STA257H1 F - Probability and Statistics I - Fall 2012

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Course Objective

This course, and its sequel, STA261H1, are mathematically quite challenging, the target audience includes anyone proceeding directly to a specialist degree in statistics, as well as anyone with serious and special interest in some other of the identifiably statistical-physical sciences. Topics are, nevertheless, very standard introductory ones: abstract probability and expectation, discrete and continuous random variables and vectors, with the special mathematics of distribution and density functions, all realized in the special examples of ordinary statistical practice: the binomial, poisson and geometric group, and the gaussian (normal), gamma, chi-squared complex. Prerequisites: MAT135Y1/MAT137Y1/MAT157Y1 (MAT137Y1/MAT157Y1 is strongly recommended).

Tutorials

Tutorials begin Sept 17. Tutorials meet every Wednesday 4-5 pm. Tutorial rooms will be posted on the course web site prior to Sept 17. Assignments will be posted on the course web site, consisting of suggested exercises, mostly from the textbook. Bring your solutions to tutorials, along with your questions about these exercises or the related theory and concepts. Expect a quiz on the material as well.

Textbook

MATHEMATICAL STATISTICS AND DATA ANALYSIS, 3rd Edition, by John Rice

Statistics Aid Centre

Your primary source of help with difficulties is your TA in the scheduled tutorial, but additional assistance can be obtained at the Statistics Aid Centre, Room 1091, in Sidney Smith Hall. Your own TA will be on duty one hour per week, but you may drop in on any of the TAs for the course. Schedules will be posted on the course web page.
Also, check out the New College Aid Centre, where an experienced Statistics TA will hold regular hours – check http://www.utstat.utoronto.ca and click on Statistics Aid Centres, for schedule.

Evaluation

Tutorial Weekly Quizzes: 15%
Test: 30%
Final Exam: 55%

Quizzes

Quizzes will be given in tutorial. A typical quiz will be a multiple choice question, you get either 1 mark (for the correct answer) or 0.3 (for attendance). Your TA will record your mark for each quiz. So be sure to attend the correct tutorial, and to know your TA's name. ***If you miss a tutorial/quiz due to illness, late enrolment, etc., please discuss with your TA, and not your lecturer or the course coordinator.*** *Your TA has full discretionary power* to deal with, and adjust tutorial grades for such things. If ill, bring some proof.

Midterm Test/Final Exam

The midterm test is on Oct 22.. Programmable calculators are not permitted on tests and exam. A one-sided 8-1/2"x 11" aid sheet, hand-written, is allowed on the test (two-sided on final exam). **You must bring your student identification to term tests as well as the final exam.** The day and time for the final exam will be announced later.

Missed Midterm Test

There are **no make-up tests**. Should you miss the term test due to illness, you must submit to your lecturer or to SS6018 (Stats office), within one week, completed by yourself and your doctor, **the 'U of T Student Medical Certificate',** obtainable from your college registrar, the Office of the Faculty Registrar (SS1006), the Stats Dept. office, or the Koffler health service. The test's weight will then be shifted to the final exam. **If proper documentation is not received, your test mark will be zero.**

Academic Offences

Academic offences are unacceptable, and harm everyone. Offenders are caught, and **sanctions can be severe** - zero in the course with annotation on the transcript for several years; suspension for a year; even expulsion. Various measures, announced and unannounced, will be taken throughout the year to reduce their incidence and to insure successful prosecution when they do occur (e.g. photocopying of students' tests, multiple versions of multiple choice exams). In addition, please note the following:

(i) ***Oversights in marking on a test paper*** (e.g. addition error, overlooked work) must be brought to the attention of the TA **immediately** - during the tutorial class when test papers are returned;

(ii) ***Regrading requests*** will only be considered for ***term tests*** which are written in ***ink***.

Tentative Lecture Outline

Week 1: Introduction to probability: set notations, Venn diagrams, probability models. Basic combinatorics.

Week 2: Rules of probability. Conditional probability. Law of total probability. Bayes' rule. Independence.

Week 3: Random variables. Discrete case: Bernoulli, Binomial, Geometric, negative Binomial, Hypergeometric, and Poisson distributions. Distribution function.

Week 4: Continuous case: Uniform, Exponential, Gamma, Beta, and Normal distributions. Density function. Poisson Processes.

Week 5: Expectation. Moments. Variance. Functions of random variables. Indicator functions and random variables.

Week 6: General Normal distribution. Chi-square distribution. Short review for the midterm.

Week 7: *Monday:* **TERM TEST tentatively set for Oct 22 on weeks 1- 6 material**
Wednesday: Joint Distribution. Marginal probability function.

Week 8: Conditional probability on a joint distribution. Marginal density function. More on independence of random variables.

Week 9: Conditional densities. Covariance. Correlation. Conditional expectation. Markov's and Chebyshev's inequalities. Laws of large numbers.

Week 10: Convolution. Cauchy distribution. Jacobian, change of variables for two dimensional case. F and t distributions.

Week 11: Order statistics. Probability generating functions. Moment generating functions.

Week 12: Convergence in Distribution. Continuity theorem for mgf's. Central Limit Theorem.

Week 13: *Monday:* Review for the Final Exam.

Note: This corresponds to parts of Chapters 1-6 of the textbook and some additional material not found in the text.