STA255H1S - Statistical Theory - Winter 2013
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Course Objective
To present basic statistical theory, building upon material covered in STA250, and preparing you for further study in Statistics (if accompanied by appropriate Math courses). Mathematical tools (e.g. calculus) will be used and emphasized. Topics to include: probability, distributions, expectation, moment generating functions, functions of random variables, sampling distributions, estimation and testing, the linear model (regression). Prerequisite: STA220H1/STA250H1/MAT135Y1/MAT137Y1/MAT157Y1

Tutorials
Tutorials begin Jan 17. Tutorials meet every Thursday 5-6pm. Tutorial rooms will be posted on the course web site prior to Jan 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 with Applications – 7th edition – by Wackerly, Mendenhall and Schaeffer
The above textbook comes with the Student Solutions Manual which is also available for purchase.

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

Quiz:
Tutorial Weekly Quizzes: 15%
Midterm 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 any problems regarding quizzes arise, please contact your TA first.

Midterm Test/Final Exam
The midterm test is in the evening of February 28. 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 the term test 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, 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) **Overights in marking on a test paper** (e.g. addition error, overlooked work) must be brought to the attention of the T.A. 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**

Coverage of topics

Topics covered will be selected from the corresponding chapters/sections in the textbook (Subject to change, and will update gradually):

**Week 1**: Review of some statistical concepts. Basic concepts and axioms of probability. (ch. 1, ch. 2 (sec 1-4))

**Week 2**: Probability and counting rules: the sample-point method, tools for counting sample points, conditional probability and independence of events, two laws of probability, the event-composition method, Bayes' rule. Random variables. (ch. 2 (sec 5-13))


**Week 4**: Probability distribution for a continuous random variable. Uniform distribution. Normal distribution. Gamma and exponential distributions. (ch. 4 (sec 1-6, 9))

**Week 5**: Bivariate and multivariate probability distributions. Marginal and conditional distributions. Independence. Expected value, covariance and linear combinations of variables. Multinomial probability distributions. (ch. 5 (sec 1-9))

**Week 6**: Functions of random variables: the distribution function and transformation methods. (ch. 6 (sec 1-5))

**READING WEEK: NO CLASSES**

**Week 7**: // TERM TEST tentatively set for Feb 28 on weeks 1-6 material //

**Week 8**: Sampling distributions related to the Normal distribution (t, chi-square, F). Central Limit Theorem. Normal approximation to the binomial distribution. (ch. 7 (sec 1-6))

**Week 9**: Estimation: Point estimates and confidence intervals. Normal estimators. Pivotal method. Large-sample CIs. Sample size. CI for sigma. (ch. 8)

**Week 10**: More on estimation: efficiency, sufficiency, consistency. Method of maximum likelihood. (ch. 9 (sec 1-7))

**Week 11**: Tests of hypothesis. Decision errors, and power. P-values. Large sample and small sample tests for means and proportions. Test for variance(s). Power of tests and Neyman-Pearson Lemma. Likelihood ratio tests. (ch. 10)

**Week 12**: Linear regression models and the General Linear Model. (ch. 11 (sec 1-7))