

STA255H1S - Statistical Theory - Winter 2015 (website at the UT Portal)

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Office hrs: M5-6pm, T 3-4pm, and available after lecture at the lecture room

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Course Objective: To present basic statistical theory, building upon material covered in STA220, and preparing you for further study in Statistics. Mathematical tools (e.g. calculus) will be used and emphasized. Topics to include: probability, discrete and continuous distributions, expectation, moment generating functions, multivariate distributions, functions of random variables, sampling distributions, methods of estimation and hypothesis testing, the linear model (regression).

Tutorials

Tutorials begin Jan 13. Tutorials meet every Tuesday 5-6pm. Tutorial rooms will be posted at the course web site prior to Jan 13. Assignments will be posted at the course web site, consisting of suggested exercises, mostly from the textbook. Bring your solutions to tutorial, 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 packaged with the Student Solutions Manual would be ideal.

Statistics Aid Centre (from Jan 12)

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 at the course web page.

Also, check out the New College Aid Centre (Wetmore Hall 68A), where experienced Statistics TAs will hold regular hours – check the schedule at <http://www.utstat.utoronto.ca> - click on Undergraduate>Statistics Aid Centres. *For additional assistance, try using the course online discussion forum.*

Evaluation

Tutorial weekly quizzes/assignments: 15%, and the maximum of {Test 35%, Final exam: 50%} or {Test 15%, Final exam: 70%}. In other words, I will downweight the midterm test from 35% to 15%, if your final exam shows improvement over the test. **The test is tentatively scheduled for Feb 24, 5-7pm, rooms: TBA. 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.**

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, the required University of Toronto documentation. 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.

Accessibility Services

The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom, or course materials, please contact Accessibility Services as soon as possible: accessibility.services@utoronto.ca or <http://accessibility.utoronto.ca>.

Coverage of topics in the textbook

Topics covered will be selected from the following chapters/sections in the textbook: Chapters 1, 2, 3 (sec 1-9, 11), 4 (sec 1-6), 5 (sec 1-10), 6 (sec 1-5), 7, 8, 9 (sec 1-4, 6-8), 10, 11 (sec 1-9), 12, 13 (sec 1-7).

Tentative Lecture Schedule (and subject to change):

Week 1 Review of some statistical concepts from last term. Basic concepts and axioms of probability. (chap 1-2)

Week 2: Probability and counting rules. Random variables and Expectation. Binomial distribution. (chap 2-3)

Week 3: Hypergeometric distribution. Poisson distribution. Negative binomial & geometric distribution. Moment generating function (mgf). Chebyshev's rule. (chap 3)

Week 4: Continuous distributions. The (cumulative) distribution function and the pdf. Uniform distribution. Normal distribution. Gamma and exponential distributions. Mgf's again. (chap 4)

Week 5: Joint, marginal and conditional distributions. Independence. Expected value, covariance and linear combinations of variables. Multinomial and bivariate normal distributions. (chap 5)

Week 6: Functions of random variables: the distribution function and transformation methods. The moment generating function method. (chap 6). Start on sampling distributions (chap 7), time permitting.

Week 7; Term test 5-6:50 pm, rooms TBA (and abbreviated lecture starting at 7:10pm, on sampling distributions, chap 7)

Week 8: Sampling distributions related to the Normal (t, chi-square, F). Central Limit Theorem. Estimation: Point estimates and confidence intervals. Normal estimators. Pivotal method. CIs for means. (chap 7-8)

Week 9: CIs for proportions. Sample size. CI for sigma. More on estimation: efficiency, sufficiency, consistency, method of moments, maximum likelihood estimation. (chap 8-9)

Week 10: Tests of hypothesis. Decision errors, and power. P-values. Large sample and small sample tests for means and proportions. (chap 10)

Week 11: Test for variance(s). Power of tests and Neyman-Pearson Lemma. Likelihood ratio tests. The General Linear Model and least-squares. Simple linear regression with one predictor. (chap 10-11)

Week 12: Regression inference. (chap 11) Bootstrapping and other topics.