STA255H1S - Statistical Theory - Winter 2016

Instructor: Olga Chilina

Office: SS6025

Office hours:

        Tuesdays, 2:00 - 3:00 pm
        Thursdays, 2:00 - 3:00 pm

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Lecture time and location:

L0101: Tue 3:00 - 4:00 pm in MS 2158
        Thu 3:00 - 5:00 pm in MS 2158

L0201: Mon 10:00 - 11:00 am in KP 108
        Wed 10:00 - 12:00 pm in WI 1016

Course Objective

To present basic statistical theory 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/ECO220Y1,MAT133Y1/(MAT135H1,MAT136H1)/MAT137Y1/MAT157Y1

Tutorials

Tutorials begin the week of Jan 18. Tutorials meet every

L0101: Tuesday 4:00 - 5:00 pm
L0201: Monday 11:00 - 12:00 pm

Tutorial rooms will be posted on the course web site prior to Jan 18. 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.

Additional help

- For continued discussion and questions outside of class, try posting on the Piazza discussion forums. The instructor and TAs will be monitoring them regularly.
- You can visit instructor (SS6025) and TAs (SS1091) during their office hours.
- There is a drop-in Statistics Aid Centre in New College: Wetmore Hall 68A. See http://www.utstat.toronto.edu/wordpress/?page id=154 for the schedule.
- E-mail should only be used for emergencies or personal matters.

Evaluation

Tutorial Weekly Quizzes: 15%
Midterm Test: 35%
Final Exam: 50%

Quizzes

Quizzes will be given in each 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 will be held during the week of February 29. **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) *Oversights 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. [chapter 1, chapter 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. [chapter 2 (sec 5-12)]

Week 3: Probability distribution for a discrete random variable. Bernoulli distribution. Binomial distribution. Geometric distribution. Hypergeometric distribution. Poisson distribution. Expected value and variance of a random variable or a function of a random variable. Moments and moment generating functions. [chapter 3 (sec 1-5, 7-9)]

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

Week 5: Bivariate and multivariate probability distributions. Marginal and conditional distributions. Independence. Expected value and covariance. Correlation. [chapter 5 (sec 1-7)]

READING WEEK: NO CLASSES

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

Week 7: // TERM TEST tentatively set for March 2 (L0201) / March 3 (L0101) on weeks 1- 6 material //

Week 8: Sampling distributions related to the Normal distribution: t, chi-square, F distributions. Central Limit Theorem. Normal approximation to the binomial distribution. [chapter 7 (sec 1-3, 5)]

Week 9: Estimation: Point estimates and confidence intervals. Normal estimators. Pivotal method. Large-sample CIs. Sample size. CI for sigma. [chapter 8 (sec 1-8 (up to page 427), 9)]

Week 10: More on estimation: efficiency, sufficiency, consistency. Method of moments. Method of maximum likelihood. [chapter 9 (sec 1-3, 6-7)]

Week 11: Hypothesis testing. P-values. Tests for population means. Decision errors and power of the tests. Hypothesis tests on variance(s). Two-sample problems. [chapter 10 (sec 1-9), chapter 8 (page 427-430)]

Week 12: Linear regression models. Method of least squares. Inferences concerning parameters β_i. Correlation. [chapter 11 (sec 1-3, 5, 8)]