University of Guelph Department of Mathematics and Statistics

STAT*2080 : Introductory Applied Statistics I

Course Outline FALL 2015

Instructor: Dr. Ayesha Ali **Email:** aali@uoguelph.ca
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Lectures: MWF 3:30 – 4:20PM MACN 105

Teaching Assistants: Carly Bobak (cbobak@mail.uoguelph.ca)
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Office Hours: Mon. 1:00 – 2:00pm (Ali)
Thurs. 12:00 – 2:00pm (Ali)

Prerequisites: 4U (or equivalent) mathematics or 0.50 credit in mathematics
Exclusions: STAT*2040, STAT*2060, STAT*2100, STAT*2120. BSC students cannot take this course for credit.

Textbook: *Introduction to the Practice of Statistics*, 8th edition, by Moore, McCabe and Craig.

Course Objectives: Statistical reasoning is used widely for economic forecasting, establishing social policy, industrial process control, evaluation of foods, market research, political forecasting, etc. This course introduces the student to the basic concepts of statistical reasoning, basic methods of exploratory data analysis and statistical inference. These concepts and methods are important in view of society's increasingly heavy use of data in personal, corporate and governmental decision making, and the obvious need for scientific investigation. Quantitative literacy is central to literacy, numeracy, understanding forms of inquiry, and independence of thought. Specific learning objectives are:

- Understand basic principles of data collection, measurement errors, study design
- Perform exploratory data analysis using modern graphical displays
- Apply statistical reasoning to real-world problems
- Understand basic probability distributions and some applications
- Understand sampling behaviour of common statistical measures
- Understand basic concepts of interval estimation and hypothesis testing
- Perform basic statistical inference procedures

Evaluation:
20% Assignments – based on best 8 out of 9 in total, all due on Thursday nights at 11:59 pm.
20% Midterm 1: Friday, October 16. 7:30-8:30pm. ROZH 104.
20% Midterm 2: Friday, November 13. 7:30-8:30pm. ROZH 104.
40% Final Exam: Friday, December 11. 11:30am-1:30pm. Location TBA.

IMPORTANT: IF YOU FAIL ALL 3 TESTS YOU CANNOT PASS THE COURSE.
NOTE: There should be NO conflicts with exam dates and times. If you do, it is YOUR responsibility to resolve the issue.
Assignments: ***Assignment marks will not count toward your final grade if you fail all 3 tests***. All assignments will be online quizzes using Desire2Learn (D2L) on Courselink. The first assignment will not

count toward your Assignment assessment, and is aimed to help you become familiar with using D2L. Further, to account for possible illnesses, computer problems, house fires, hungry dogs, etc., I will throw out your worst assignment grade. So in total there will be 8 assignments that will contribute towards the Assignment portion of your final grade.

Each student is responsible for doing his or her own work. Discussing course material with other students is encouraged, but getting another student to do any or all graded work for you is academic misconduct. See http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml.

D2L Quizzes: There are a few subtleties when it comes to taking these D2L quizzes, so please read the document "Introduction to Quizzes for STAT*2080" on the Courselink course website. **READ THIS DOCUMENT**! The assignment questions will be posted on D2L in pdf format a few days before the due date, and the actual quiz should be available soon thereafter. You should have unlimited attempts, but only your last submission will be graded (after the due date). Remember to **save** your answers right after you enter them **and then submit** the assignment at some time prior to the time that the assignment is due. Since there will be plenty of time to do the assignments, I will not accept excuses such as: I was caught in traffic, the CCS wireless network was down, etc. If you leave the assignments to the last minute, and a problem occurs, you deal with the consequences. In short, **if you do not submit your answers before the due date and time, you will receive a mark of zero**. To access D2L, log in with your GryphMail account login and password at **http://courselink.uoguelph.ca/**.

Exams: The regular midterms and final exam will be multiple choice (computer-graded bubble sheet) exams. You must bring a calculator and pencil to the tests, and are also allowed the following help sheets: for Midterm 1, **one** two-sided **handwritten** 8.5" × 11.5" sheet; for Midterm 2, **two** two-sided **handwritten** 8.5" × 11.5" sheets; for the Final exam, **three** two-sided **handwritten** 8.5" × 11.5" sheets.

POLICY FOR MISSED MIDTERMS: If you miss a midterm test due to medical illness or another valid (and documented) reason, your final exam will be reweighted to make up for the missed midterm.

GETTING HELP IN THE COURSE: Make use of all of the resources available to you if you feel you need help. Talk to your fellow students (either in person or online via D2L discussions); visit the **Mathematics and Statistics Learning Centre** on the 3rd floor of the library (behind the elevators) which is staffed by graduate teaching assistants to help students in introductory math/stat courses; come to course office hours; or get a private tutor. Visit http://uougleph.ca/tutoring or the Math & Stats main office on the fourth floor of MACN to seek private tutors.

ACADEMIC MISCONDUCT: The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

GUIDELINE OF TOPICS COVERED: Most of the topics covered in the textbook ***up to and including Section 7.1 of the textbook***, and Section 7.2, time-permitting. Copies of the textbook are available on Course Reserve in the Library. Some topics may be added or omitted throughout the semester, depending on time. However, this guide will help you gauge the pace of the course.

Week	Topic
1	Descriptive statistics; types of data, plots and frequency tables, Location, scale; mean, standard deviation, percentiles, boxplots; Normal distribution; standardized *z*-scores; using tables. (Chapter 1; Assn 0)
2	Scatterplots; correlation; least-squares regression; residual plots; outliers and influential points. (Chapter 2; Assn 1 due)
3	Lurking variable; extrapolation; two-way tables; joint/marginal distributions; conditional distributions; Simpson's paradox. (Chapter 2; Assn 2 due)
4	Causation vs. association; experiments vs. observational studies; randomization; matched pairs and block designs; sampling distributions; bias; ethics. (Chapter 3; Assn 3 due)
Mon. Oct. 14	**THANKSGIVING -- NO CLASSES**
5	**REVIEW** (no assignment this week)
Fri. Oct. 16	**MIDTERM 1** (**7:30 – 8:30pm**, ROZH 104)
6	Probability; randomness, sample spaces; probability rules; discrete/continuous random variables; Normal random variables. (Chapter 4; Assn 4 due)
7	Mean/variance of random variables; law of large numbers; rules for means and variances; sampling distribution of sample mean. (Chapters 4, 5; Assn 5 due)
8	Central limit theorem; Binomial distribution for counts; binomial mean, standard deviation, Normal approximation, continuity correction; confidence intervals. (Chapters 5,6; Assn 6 due)
9	Confidence intervals (cont'd); behaviour of confidence intervals. (Chapter 6)
Fri. Nov. 13	**MIDTERM 2** (**7:30 – 8:30pm**, ROZH 104; no assignment this week)
10	Sample sizes; hypothesis tests; tests of significance; *p*-values and alpha levels. (Chapter 6; Assn 7 due)
11	*t*-distribution, one-sample *t*-test; matched pairs *t*-test; robustness (Chapter 7; Assn 8 due)
12	*Time permitting*: two-sample *z*-test; two-sample *t*-test; two-sample confidence intervals; robustness; pooled *t*-test. (Chapter 7; Assn 9 due)
Fri. Dec. 11	**FINAL EXAM** (**11:30 – 1:30pm, room TBA**)