

THE PRACTICE OF STATISTICS I

STA 220H1F – L0401/L0501 (Online sections) - Fall 2015

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How and when will the course operate?

See the "Course Schedule".

Course content

This course will provide an intuitive introduction to fundamental statistical concepts and reasoning. The course will cover: methods of data collection; constructing effective graphical and numerical displays; estimating and describing the natural variability in data; and the key ideas in how statistical tests can be used to separate significant differences from those that are only a reflection of the natural variability in data.

The learning objectives of the course are:

- Understand the ideas, principles, and considerations that are common to all statistical methods,
- Develop a statistical toolbox of some methods for the collection, analysis, and display of data,
- Identify appropriate uses of the statistical methods, including their strengths and limitations, and
- Develop statistical literacy, including the ability to recognize the importance of data in decision-making and understand the social and scholarly applications of statistics.

Topics to be covered

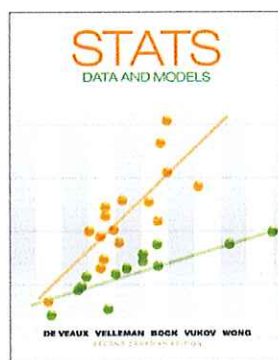
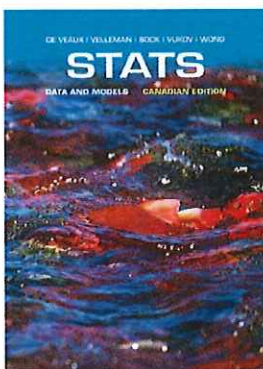
<u>Topic</u>	<u>Description</u>
A first look at data	Summary statistics and graphical displays for a single categorical or quantitative variable and for relationships between two variables.
Collecting Data	Sampling. Observational studies and experiments. The effect of confounding and concluding causation.
Probability	Probability models, Bayes' theorem, the normal distribution, the Law of Large Numbers, the Central Limit Theorem, sampling distributions.
Confidence Intervals	Confidence intervals for proportions and means.
Statistical Tests	Tests of significance for proportions and means.
Two Samples	Tests of significance and confidence intervals for proportions and means in the two-sample case.
Linear Regression	Method of least squares, evaluating model fit, the effects of outliers and influential observations.

Textbook

There is no required course textbook. All of the course material is contained in the videos and notes.

There are many textbooks that cover the topics in the course. Two recommended textbooks are:

Stats: Data and Models, first Canadian edition, by Richard D. De Veaux, Paul F. Velleman, David E. Bock, Augustin M. Vukov, and Augustine C.M. Wong. 1st or 2nd ed.



This textbook is available at the University of Toronto bookstore. It is extremely easy to read and is written in a conversational style. Most of the concepts are clearly explained and there are lots of fun and interesting vignettes that illustrate statistical concepts.

OpenIntro Statistics. Diez, D. Barr, C. D., and Cetinkaya-Rundel Mine. <https://www.openintro.org/stat/textbook.php>



OpenIntro Statistics is free and available to download. This is an excellent textbook that is less conversational compared to the Velleman et al. textbook. However, the concepts are clearly explained. A nice feature of the text and website is that many of the examples and vignettes used to illustrate the concepts are based on real applications of statistics.

Calculators

You will need a calculator. Any calculator that has logarithmic functions will be sufficient. Calculators on phones or other devices equipped to communicate with the outside world (for example, through the internet or cellular or satellite phone networks) will not be permitted during the term test and the final exam.

Computing

We will use R for all examples. R is freely available for download at <http://cran.r-project.org> for Windows, Mac, and Linux operating systems. For the test and exam, you will need to know how to interpret output from R. You will not need to know R commands. Those of you who would like to learn how to do the analysis yourself using R can watch the optional R videos (which show how to replicate the work done in the video lectures).

Discussion Forum

All sections of STA220 will be using Piazza as a platform for discussions. Details will be given during the first week of classes on how to sign up.

Additional help

Need extra help with the coursework? Here are some options:

- Post your question on the class discussion forum on Blackboard. The instructor and TAs will monitor this discussion forum regularly.
- The instructor and TA will have weekly online office hours. During these times you will be able to communicate directly through video and chat with the instructor or TA.
- E-mail should only be used for emergencies or personal matters. If you email a question to the instructor or TA then you will be asked to post your question on the discussion forum. In other words, individual questions about the course content will not be answered via email.

Evaluation

In order to pass the course you must obtain a mark of least 50% on the final exam.

	Weight	Date	Time	Location
Midterm #1	5%	Tuesday, October 20	45 minute timed exam. Available online between 6:00-22:00	Online portal
Midterm #2	5%	Tuesday, November 17	45 minute timed exam. Available online between 6:00-22:00	Online portal
Group problems	9%	Mondays: First answer. Thursday: Contribute to group discussion and optional second answer	Submit by 23:59	Online (Portal)
Weekly online hand-in problem	10%	Sundays	Submit by 23:59	Online (Portal)
Research Survey	1%	Pre-survey: Within one-week of enrolling in the course. Post-survey: Within one-week of completing the course		
Weekly quizzes	10%	Sundays	Submit by 23:59	Online (Portal)
Exam (not online)	60%	Scheduled by Faculty of Arts and Science		

Online assignments

There are three types of assignments for students to complete:

1. Weekly quiz. This is an online quiz on the videos that you watched during the week. This should be done after watching the videos posted each week.
 - By each Sunday at 23:59, you must complete an online quiz on The Portal.
 - The weekly quiz will cover material in the videos to be watched that week.
 - The quiz will consist of multiple choice and true/false questions, randomly chosen from a pool of questions.
 - The number of questions will vary from week to week but the quizzes will be equally weighted.
 - You will find out your score immediately and you can take the quiz as many times as you'd like up to the Sunday 23:59 deadline.
 - Your final quiz score will be the highest score from all of your attempts. Note that you will get a different randomly generated quiz each time.

2. Group problems. Within the first two weeks of the course students will be randomly assigned to a small (3-5 students) online discussion group. A multiple-choice problem will be assigned once per week that you will discuss with your online group.

The question will usually be posted by Monday at midnight (00:00/12:00 a.m.). You will have two opportunities to answer this question: the first opportunity will be within the first 24 hours after the question is posted (Tuesday, 23:59); and the second opportunity will be within the last 24 hours (Thursday 23:59) before your final answer is due.

- One third of your grade for this problem will be for answering the question within the first 24 hours (both correct and incorrect answers will receive full marks);
- One third of your grade will be for participating in an online discussion forum with your group. This discussion forum is separate from the general STA220 discussion forum hosted on Piazza. You must show evidence of some reasoning in your discussion forum posts to receive credit (see the grading rubric below). The details of how to access your groups discussion forum will be given out within the first two weeks of class.

Your online discussion of the weekly group problem will be graded using the following rubric.

	Beginning (0%)	Developing (50%)	Accomplished (100%)
Participation (2 marks)	Little to no contribution over the course of the discussion.	Not quite enough – Contributions to discussion on at least 2 separate days spread over the discussion period. OR Too much – Too many contributions that dominate the discussion	Contributions are regular and spread out well over the discussion period. They do not dominate the group discussion.
Quality (2 marks)	Postings missing and/or are generally not substantive (e.g., I agree).	Contributions may be unnecessarily long and possibly lack focus. OR They contain typos and grammatical errors.	Contributions are clear and to-the-point, add something to the discussion and are free of typos and grammatical errors.
Engagement with others (2 marks)	Little to no substantive responses to others' postings.	Some responses to others' postings but they may not demonstrate reflection on their content, and/or they may discourage further productive dialogue. OR Little to no replies to others' responses to own postings.	Responses to several others' postings that demonstrate reflection on their content and to replies to responses on own. Contributions are positive, move the discussion forward and encourage postings from other group members.
Application of course concepts (4 marks)	Little to no reference to course concepts and, if applicable, experience.	References to course concepts not quite correct or content/ experiences described not clearly connected to contributions and/or topic. OR Ideas/concepts presented in postings were already presented by another person in the group.	Accurate, appropriate, new references to course concepts. Clear connection to topic.

- One third of your grade will be for a correct final answer. Your final answer is usually due by Thursday at 23:59.
3. A weekly hand-in problem will be posted online every Sunday at 23:59 and due in one week on Sunday at 23:59. The hand-in problem must be submitted via portal. Email submissions will not be accepted. Your answers to the hand-in problem will be graded out of 10 according to the following rubric:

	Novice	Competent	Proficient
Rationale	Points: 0 (0%) None or very little rationale provided to support final answer.	Points: 2.5 (25%) Some rationale is given but it may not fully support the final answer or conclusion.	Points: 5 (50%) A clearly articulated rationale is given that clearly supports the final answer.
Final Answer	Points: 0 (0%) None of the final answers are correct or all the answers are missing.	Points: 2.5 (25%) Some of the final answers are correct, but a few might be incorrect.	Points: 5 (50%) All or almost all of the final answers are correct.

Term test and exam

Term test #1 will be available on portal on October 20, 2015 from 6:00-22:00. You will have 45 minutes to complete the test. This means that you should begin the test no later than 21:15 so that you have the full 45 minutes to complete the test.

Term test #2 will be available on portal on November 17, 2015 from 6:00-22:00. You will have 45 minutes to complete the test. This means that you should begin the test no later than 21:15 so that you have the full 45 minutes to complete the test.

The faculty of arts and science schedules the final exam. You must bring your student identification to the final exam.

Missed Tests

- If a test is missed for a valid medical reason, you must submit the University of Toronto Verification of Student Illness or Injury form (<http://www.illnessverification.utoronto.ca>) to your instructor (Dr. Nathan Taback) within one week of the test via email (nathan.taback@utoronto.ca) by email.
- The form will only be accepted as valid if the form is filled out according to the instructions on the form.
- **The form must indicate that the degree of incapacitation on academic functioning is moderate, serious, or severe in order to be considered a valid medical reason for missing the term test. If the form indicates that the degree of incapacitation on academic functioning is negligible or mild then this will NOT be considered a valid medical reason.**
- If a test is missed for a valid reason then you will be given a makeup test. The instructor will schedule the time and date of the makeup test.
- If a student misses both the originally scheduled and makeup tests then a grade of zero will be assigned for the makeup test.
- Other reasons for missing a test will require prior approval by your instructor. If prior approval is not received for non-medical reasons then you will receive a grade of zero for the missed midterm test.

Marking concerns

Any requests to have discussion forums or hand in problems re-evaluated must be made in writing directly to the TA within one week of the date the work was marked. The request must contain a justification for consideration.

How to communicate with your instructor

Questions about course material, such as,

- How do I do question 3.7 in the textbook?
- What is standard deviation?
- When is the midterm?

Should be posted on the discussion forums on Piazza. Questions can be posted anonymously (so that the author is anonymous to other students but not to the instructors), if desired.

If your communication is private, such as, I missed the test because I was ill, then e-mail your instructor. Use your utoronto.ca e-mail account to ensure that your message doesn't automatically go to a Junk folder and include your full name and student number.

Academic integrity

You are responsible for knowing the content of the University of Toronto's Code of Behaviour on Academic Matters at

<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>.

If you have any questions about what is or is not permitted in this course, please do not hesitate to contact your instructor.

Accessibility needs

The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the class room, or course materials, please contact Accessibility Services as soon as possible:

accessibility.services@utoronto.ca or <http://accessibility.utoronto.ca>.

Your responsibilities

The course is designed to actively engage you in the course material. We hope you'll find the subject of statistics interesting, challenging, and fun, and an excellent opportunity to truly learn the material. In order for these sessions to be effective, preparing by learning about the week's concepts through the videos and notes is essential.