THE PRACTICE OF STATISTICS I

STA 220H1F – Fall 2017

Instructor	Section	Time (Location)
Dr. Bethany White Office: SS 6018 e. bethany.white@utoronto.ca	L9901	W 9-10 (online-Portal)
	L9902 (Social Work)	W 9-10 (online-Portal)

How and when will the course operate?

This course is run fully online. See the "Course Schedule" (last two pages of this syllabus). If you have not taken an online course before, you are strongly encouraged to read the information at http://onlinelearning.utoronto.ca/is-online-learning-for-me/ to learn more about what is involved and assess whether this format is right for you.

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.
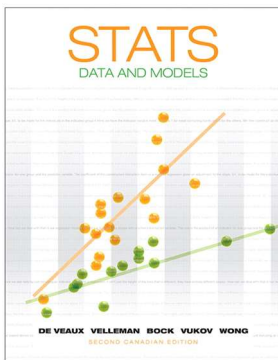
Topics to be covered

Topic	Description
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 if you would like a book for reference. Two recommended textbooks are:

1. Stats: Data and Models, second Canadian edition, by Richard D. De Veaux, Paul F. Velleman, David E. Bock, Augustin M. Vukov, and Augustine C.M. Wong. 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.

2. 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 basic (i.e., non-programmable) calculator will be sufficient (no statistical functions are necessary). 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 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).

Additional help

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

- **Have a question about STA220 online course content or administration?**
    - Review the questions already posted on the Portal discussion board for the STA220 online section, and if your question hasn't already been addressed, post your question there.
    - Visit the instructor's and TA's office hours (Instructor office hours will be available online and in-person on campus –hours will be posted on Portal.)

- Post your **course content question** on the class discussion forum on Piazza (and/or review the questions and answers already posted): All 7 sections of STA220 will have access to a common Piazza forum for questions. This forum will be monitored regularly by TAs. Details on how to sign up will be given during the first week of classes.

- **Need to reach the instructor about a personal matter (e.g., illness, grades)?** Email the instructor. Note that e-mail should only be used for emergencies or personal matters. *If you email a question to the instructor about course material or course administration, then you will be asked to post your question on the Portal discussion board – these types of questions will not be answered via email.* Note also that the TAs will not be available for contact over email, etc, outside of their scheduled office hours or online forums or sessions.

Evaluation

Assessment	Weight	Notes
Weekly quizzes	15% (equally weighted)	
Online Term Test	10%	
Assignments (3) - Part 1 - Individual component (4% each) - Part 2 - Group component (3% each)	21%	
Attendance & participation in online class sessions *(must participate in at least 8 of the 12 for full credit)*	4% (0.5% each)	
Final Exam	50%	*Scheduled by Faculty of Arts and Science*

Weekly quizzes

These are online quizzes based on the videos that you watched during the week. They should be completed after watching the videos and you may retry the quizzes as many times as you wish before the deadlines.

- By each Sunday at 23:59 (i.e., 11:59 pm), you must complete an online quiz on 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 receive a different randomly generated quiz each time.
- Attempt these early in the week. There is no accommodation available for missed weekly quizzes, even for valid reasons.

Online Term Test

The term test will be written online (Portal). You will have 60 minutes (i.e. 1 hour) to complete the test during the availability period – refer to the schedule on the last two pages of this syllabus and Portal for more information on the term test and the availability period.

Assignments

There will be three assignments during the term – each assignment will consist of an individual component to be completed and submitted on your own, followed by a group component where you will work on new, but related, questions with your group members on your Portal discussion board. You must contribute collaboratively to your group's answers and participate regularly with your group members on your Portal discussion board during the week to earn credit for the group component of the assignment. Assignment questions will be posted on Portal the Monday of the week assigned (see Schedule on the last page of the syllabus) and will be due the Sunday of that week. ***Due to the nature of these assignments, there will be <u>no extensions</u> granted on the individual or group components under any circumstances.*** If you miss an assignment (or one of the two components of assignment) for a valid reason covering at least 3 days including the due date and request accommodation from your instructor within a week of the due date, the weighting for that missed assignment component will be shifted to your final exam. Additional assignment information and instructions will be posted on Portal.

Class Session Participation

There will be <u>**twelve**</u> synchronous online classes (Wednesdays 9:00AM-10:00AM EST) - attendance and participation is mandatory for these sessions (see the Course Schedule on the last page of this syllabus). Participation could involve activities such as completing a survey in advance, or completing online activities during the session (e.g., typing answers to a questions in the chat box, answering polls). In order to earn the 0.5% for a particular synchronous class session, you must complete any advance survey or activity and log in to Blackboard Collaborate though Portal and complete the activities throughout the synchronous class session.

What happens if you miss an online class? You must fully participate in <u>***at least 8***</u> of these online classes to earn the full 4%. There is no accommodation available for missing more than 4 of the online classes.

Final exam

The Faculty of Arts and Science schedules the final exam. You must bring your student identification to the final exam.

The University of Toronto, St. George, Arts and Science final examination will require your attendance on Campus.

If you are eligible and require off-site proctoring, please notify your Faculty registrar and submit your request *no later than twelve (12) business days* after the start of term.

If requested on time, the Arts and Science Registrar will endeavour to provide arrangements for proctored exam writing for students residing more than 125 km travel distance from the campus at a proposed outside examination centre. You must provide the contact information of an institution in your area offering proctoring services, however, please note that the requested location is not guaranteed and an alternative test centre may be identified. Students are responsible for any fees charged by the test centre. Please contact the Faculty Registrar's Office for further details.

For more information see FAQs for Off-Site Exams (http://www.future.utoronto.ca/current-students/enhanced-learning-opportunities/online-learning#Exam)

Missed Online Term Test

- 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 within *one week of the test* (*note for the term test, your medical documentation must cover the entire availability period*).
- 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 an online makeup test. The instructor will schedule the time and date of the makeup test. The online makeup test will be worth 5% of the course grade and the final exam will be worth 55% of the course grade.
- If both the originally scheduled and makeup tests are missed for valid reasons approved by the instructor, then the final exam will be worth 60% of the course grade; otherwise, zero will be recorded for the term test and the final exam will remain worth 50% of the course grade.
- Other reasons for missing a test will require <u>prior</u> 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 term test.

Marking concerns

Any requests to have assignments re-evaluated must be made in writing to your instructor within <u>one week</u> of the date the marks were posted. The request must contain a detailed justification for consideration and make specific references to relevant course material. Otherwise, these requests will not be addressed.

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 term test?

should be posted on the online section Portal discussion board or the discussion forums on Piazza. 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.

Working collaboratively with other students in this course can help you learn the material, if done in a productive way. Explaining concepts and working towards solutions together helps everyone understand the material better. Therefore, you are encouraged to form groups to review the material and work through practice problems together. In this course, different assessments permit different levels of independent work:

- **Weekly quizzes** – 'open-book', you <u>can</u> work together collaboratively with other students in the course but everyone must submit their own quizzes;
- **Term Test** – 'open-book', this is a chance to you to assess your understanding of the material so you must work independently – <u>no</u> working with others;
- **Assignments – Individual Components** – 'open-book', this is a chance to you to assess your understanding of the material so you must work independently – <u>no</u> working with others;
- **Assignments – Group Components** – 'open-book', you must collaborate with your group members online in your group's Portal discussion board;
- **Final Exam** – allowable aids to be announced, you must work independently – <u>no</u> working with others.

Note: Submitting another student's work as your own, or providing your own work to another student for him/her to submit as his/her own is considered as an academic offense (regardless of the assessment) and will be reported as such.

Academic offenses will be taken very seriously and dealt with accordingly. Therefore, 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 the online classes to be effective, preparing in advance by learning about the week's concepts through the videos and notes is essential.

This course is fast-paced and the material is cumulative, and it will be difficult to understand new concepts if you don't understand previous concepts. This means it's really easy to fall behind - it's even easier in this section since this is an online class. It is strongly recommended that you set aside regular time each week to devote to this course and participate in the weekly online sessions. Also, be sure to ask questions to the instructor or TAs as soon as any concept(s) are the least bit unclear.

Online STA220 Schedule – Fall 2017

Week	Dates	Module/Topic	Activities & Due Dates
0	Sept 4-10	0-Introduction & 1-Summarizing Data	Review the "Getting Started" information on Portal and introduce yourself on the Portal Discussion Board Two online quizzes (**Summarizing data: one variable** & **Summarizing data: relationships between two variables**) due 23:59, Sun, Sep 17
1	Sept 11-17	1- Summarizing Data	Introduce yourself on the Portal Discussion Board Online Class (Intro) – 9-10am, Wed, Sep 13 – Blackboard Collaborate Two online quizzes (**Summarizing data: one variable** & **Summarizing data: relationships between two variables**) due 23:59, Sun, Sep 17
2	Sept 18-24	2 - Intro to Probability (I)	Online Class (Summarizing Data) – 9-10am, Wed, Sep 20 on Portal **Assignment #1 – Individual component** due 23:59, Sun, Sept 24 Online quiz (**Probability: Events**) due by 23:59, Sun, Sept 24
3	Sept 25 – Oct 1	3 - Intro to Probability (II)	Online Class (Probability 1) – 9-10am, Wed, Sep 27 on Portal **Assignment #1 – Group component** due 23:59, Sun, Oct 1 Online quiz (**Probability: Random Variables**) due 23:59, Sun, Oct 1
4	Oct 2-8	4 - Sampling Distributions	Online Class (Probability 2) – 9-10am, Wed, Oct 4 on Portal Online quiz (**Sampling Distributions**) due 23:59, Sun, Oct 8
5	Oct 9-15	5 - Data Collection	Online Class (Sampling Distributions) – 9-10am, Wed, Oct 11 on Portal Online quiz (**Data Collection**) due 23:59, Sun, Oct 29
6	Oct 16-22	5 - Data Collection (continued)	Online Class (Midterm Review) – 9-10am, Wed, Oct 18 on Portal **Online MIDTERM (available on Portal Oct 19-20)** Online quiz (**Data Collection**) due 23:59, Sun, Oct 29
7	Oct 23-Oct 29	6 - Inference – Confidence Intervals (I)	Online Class (Data Collection) – 9-10am, Wed, Oct 25 on Portal **Assignment #2 – Individual component** due 23:59, Sun, Oct 29 Two online quizzes (**Data Collection** & **Confidence Intervals Part 1**) due 23:59, Sun, Oct 29

8	Oct 30-Nov 5	7- Inference – Confidence Intervals (II)	Online Class (Confidence Intervals 1) – 9-10am, Wed, Nov 1 on Portal Online quiz (**Confidence Intervals Part 2**) due 23:59, Sun, Nov 5
Reading Week	Nov 6-12	8 - Inference – Hypothesis Testing (I)	READING WEEK – NO ONLINE CLASS Nov 8 Online quiz (**The Process of Statistical Tests**) due 23:59, Sun, Nov 12
9	Nov 13-19	9 - Inference – Hypothesis Testing (II)	Online Class (Confidence Intervals 2 & Intro to tests) – 9-10am, Wed, Nov 15 on Portal **Assignment #2 – Group component** due 23:59, Sun, Nov 19 Online quiz (**The Effective Use of Statistical Tests**) due 23:59, Sun, Nov 19
10	Nov 20-26	10 - Associations – Comparing two groups	Online Class (Hypothesis Tests) – 9-10am, Wed, Nov 22 on Portal **Assignment #3 – Individual component** due 23:59, Sun, Nov 26 Online quiz (**Comparing Two Groups**) due by 23:59, Sun, Nov 26
11	Nov 27-Dec 3	11 - Associations – Simple Linear Regression	Online Class (Comparing two groups) – 9-10am, Wed, Nov 29 on Portal **Assignment #3 – Group component** due 23:59, Sun, Dec 3 Online quiz (**Linear Regression**) due by 23:59, Sun, Dec 3
12	Dec 4-Dec10		Online Class (Regression & Review) – 9-10am, Wed, Dec 6 on Portal
Exam Period	*Dec 9-20*		*3-hour final exam to be scheduled by the Faculty of Arts and Science during this period.*