

# THE PRACTICE OF STATISTICS I

## STA 220H1F – Fall 2017

| Instructor  | Section                        | Time (Location)                    |
|---|--------------------------------|------------------------------------|
| Shivon Sue-Chee<br>e. <a href="mailto:shivon.sue.chee@utoronto.ca">shivon.sue.chee@utoronto.ca</a>  | L0201                          | M 3-5 (MC102)<br>W 4-5 (MC102)     |
|   | L0301 (Health & Life Sciences) | T 11-12 (BR200)<br>R 11-1 (BR200)  |
| Karen Huynh Wong<br>e. <a href="mailto:karen.huynhwong@utoronto.ca">karen.huynhwong@utoronto.ca</a> | L0101 (Env Sci)                | M 10-12 (AH100)<br>W 10-11 (NF003) |
|   | L0401                          | T 3-4 (ESI050)<br>R 3-5 (ESI050)   |
|   | L5101                          | T6-9 (MC102)                       |

### 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

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- 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

| <b><u>Topic</u></b>  | <b><u>Description</u></b>   |
|----------------------|---|
| 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.                                      |

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## **Textbook**

There is no required course textbook. All of the course material is contained in the videos and notes on <http://sta220.utstat.utoronto.ca>

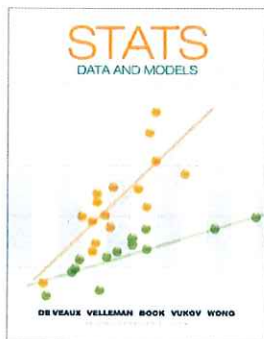
There are many textbooks that cover the topics in the course. Two recommended textbooks are:

**1. 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.

**2. 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, 2<sup>nd</sup> 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.

## **Calculators**

You will need a calculator. Any calculator 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 Piazza. The instructor and TAs will monitor this discussion forum regularly.
- The instructor and TAs will have weekly office hours.
- 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.

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## Evaluation

Grades will be calculated using two schemes. The final course grade will be the largest of these two grades.

| Assessment          | Scheme 1 | Scheme 2 |
|---------------------|----------|----------|
| Class Participation | 5%       | 0%       |
| Weekly Quiz         | 15%      | 15%      |
| Midterm             | 30%      | 35%      |
| Final Exam          | 50%      | 50%      |

For example, if a student obtained 75% using Scheme 1 and 78% using Scheme 2 then the final course grade is 78%.

|                | Date                                     | Time            | Location         |
|----------------|--|-----------------|------------------|
| Midterm        | L0101: Monday, Oct. 23                   | 10:10-11:40     | To be determined |
|                | L0201: Monday, Oct. 23                   | 15:10-16:40     |                  |
|                | L0301: Thursday, Oct. 19                 | 11:10-12:40     |                  |
|                | L0401: Thursday, Oct. 19                 | 15:10-16:40     |                  |
|                | L5101: Tuesday, Oct. 17                  | 18:10-19:40     |                  |
| Weekly quizzes | Sundays (see course schedule)            | Submit by 23:59 | Online (Portal)  |
| Final Exam     | Scheduled by Faculty of Arts and Science |                 |                  |



## **Weekly Quizzes**

You will be given an online quiz on the topics covered in the weekly modules. This should be done after watching the videos and reading the notes posted each week.

- The due date will always be on Sunday at 23:59. Please see the course schedule for specific due dates.
- 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. This means that you will not be penalized for taking the quiz again even if you obtain 100% on a previous attempt.

## **Term test and exam**

The term test will be written during class time. The time and date will be different for each section of the course (see schedule above). Students will only be allowed to write the term test in their section. You must bring your student identification to the term test.

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

Students are allowed to bring a one-sided 8.5" X 11" handwritten aid sheet on the test and a two-sided aid sheet on 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 within one week of the test.
- 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 multiple choice 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 final grade and the remaining test weight will be shifted to the final exam.
- 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 your midterm test remarked must be made in writing to your instructor within one week of receiving your test. 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?

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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](mailto: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.