STA238H1-S: Probability, Statistics and Data Analysis II
Winter 2026

sta238@course.utoronto.ca

Course Description

This course will provide an introduction to statistical inference and practice. Topics covered include *statistical models and parameters*, *estimators of parameters and their statistical properties*, *methods of estimation*, *confidence intervals*, *hypothesis testing*, *likelihood function*, and *the linear model*. Data analysis and computer simulation in R will be taught and used for calculations and to guide the theoretical development.

Quercus Information

This course uses the University's learning management system, Quercus, to post information about the course. This includes lecture and tutorial materials as well as sharing important announcements and updates. New information and resources will be posted regularly as we move through the term. To access the course website, go to the U of T Quercus log-in page at `https://q.utoronto.ca`.

SPECIAL NOTE ABOUT GRADES POSTED ONLINE: Please also note that any grades posted are for your information only, so you can view and track your progress through the course. No grades are considered official, including any posted in Quercus at any point in the term, until they have been formally approved and posted on ACORN at the end of the course. Please contact the teaching team as soon as possible if you think there is an error in any grade posted on Quercus.

Course Structure

We will meet **in person** during the lecture times listed below. Tutorials will occur weekly in smaller groups in person. You are expected to attend all lectures and tutorials in person. Office hours will be announced on Quercus. The lecture and tutorial schedules may be updated during the term. Check ACORN (`https://acorn.utoronto.ca/`) for the most up to date schedules. Any updates will be announced on Quercus as well. In addition to the in-person classes, you will be assigned to complete online R modules.

Lectures

Instructor	Lecture Section	Time	Location
Emily Somerset	Lec0101	Mon 09-11 AM Wed 09-10 AM	MC 102
	Lec0201	Mon 01-03 PM Wed 01-02 PM	
Luis Sierra Muntane	Lec0301	Tue 03-05 PM Thu 04-05 PM	PB B250 HS 610
Michael Jongho Moon	Lec5101	Tue 07-08 PM Thu 06-08 PM	MS 3153

Tutorials

Lecture Section	Tutorial Section	Time	Location
Lec0101	Tut0101	Wed 10-11 AM	GB 220
	Tut0102		UC 161
	Tut0103		HA 403
	Tut0104		GB 244
	Tut0105		BA 2185
Lec0201	Tut0201	Wed 02-03 PM	MS 2173
	Tut0202		SF 3202
	Tut0203		WB 130
	Tut0204		GB 304
	Tut0205		UC 256
Lec0301	Tut5201	Thu 05-06 PM	HS 106
	Tut5202		MS 4171
	Tut5203		MS 4279
	Tut5204		MC 254
Lec5101	Tut5101	Tue 06-07 PM	MC 252
	Tut5102		MS 4279
	Tut5103		HS 106
	Tut5104		UC 161
	Tut5105		UC 144

*You must be registered in a tutorial section that belongs to your lecture section.
**All times are in Toronto time (EST/EDT).

Textbooks and Reference Materials

MIPS ***A modern introduction to probability and statistics: Understanding why and how*** (2005, First Edition) by Frederik M. Dekking, Cornelis Kraaikamp, Hendrik P. Lopuhaä, and Ludolf E. Meester. `https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/fedca1/cdi_askewsholts_vlebooks_9781846281686`

MMSA ***Modern mathematical statistics with applications*** (2021, Third Edition) by Jay L. Devore. `https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/fedca1/cdi_askewsholts_vlebooks_9783030551568`

BYRL ***Chapters 1 - 3, Bayes Rules! An introduction to applied Bayesian modeling*** (2021) by Alicia A. Johnson, Miles Q. Ott, Mine Dogucu. `https://www.bayesrulesbook.com/`

SREB (optional) ***Chapters 1 & 2, Statistical rethinking: A Bayesian course with examples in R and Stan*** (2020, Second Edition) by Richard McElreath. Link to the chapters are available at `https://xcelab.net/rm/statistical-rethinking/`

SUPP (optional) ***STA238 Supplementary material*** (2021) by Alison Gibbs and Alex Stringer. `https://awstringer1.github.io/sta238-book/index.html`

Grading Scheme

Item	Due	Weight
Syllabus Scavenger Hunt (1%)		
Syllabus Scavenger Hunt	Jan 26, 2026	1%
Tutorial Learning Activities (12%)		
Activity 1	Week 2	2% each
Activity 2	Week 4	
Activity 3	Week 6	
Activity 4	Week 9	
Activity 5	Week 11	
Activity 6	Week 12	
Tutorial Quizzes (27%) (Best 3 out of 4)		
Quiz 1	Week 3	9% each
Quiz 2	Week 5	
Quiz 3	Week 10	
Quiz 4	Week 13	
Tests (60%)		
Midterm	Feb 27, 2026 3 PM to 5 PM	20%
Final Exam	TBD	40%

Syllabus Scavenger Hunt will be available on Quercus. It will be a timed Quiz on Quercus based on this syllabus. You will have unlimited number of trials for the quiz and the latest trial will be used for your grade. The quiz will not reveal your mark between your attempts. Please ensure you have a clear understanding of this syllabus for the quiz.

Tutorial Learning Activities will take place in the tutorials during the weeks listed above. You will work in pairs to complete a set of questions during the tutorial. The tutorial activities will require one laptop or tablet with wireless Internet access per group. You and your partner must be enrolled in the same tutorial section, be present in person, and actively contribute to the tutorial activity. The activities will reinforce concepts discussed in class or introduce new concepts. There is no make-up for missed tutorial activities and up to 2 missed activities will be accommodated based on the course policy on missed work listed below.

Tutorial Quizzes will take place in tutorial sessions during the weeks indicated above. The quizzes will consist of questions based on the previous lectures and weekly R modules, which will be available online. Quizzes must be written in the tutorial section in which your are officially enrolled, and you will be asked to show your student identification at tutorials. You will receive a grade of 0 if you are not present at your tutorial or if you write a tutorial quiz in another tutorial section. Best 3 out of 4 the Quizzes will count towards your final course grade. There is no make-up for missed tutorial quizzes and up to 1 missed quiz will be accommodated based on the course policy on missed work listed below.

Midterm & Final Exam will both be in person. The midterm will take place **from 3 PM to 5 PM on Friday, February 27, 2026**. Should you miss the midterm, you can request to write the make-up which is tentatively scheduled for **5 PM to 7 PM on Friday, March 6, 2026**. Should there be an update, we will announce the updated schedule via Quercus prior to the midterm date. The final exam will be 3-hours long and will be scheduled by the Faculty of Arts and Science during the final assessment period in April.

Bonus grades of up to 2% will be awarded based on an online quiz following a series of learning strategy workshop videos. Details on the bonus grades will be shared on Quercus.

Computing

We will use R for simulations and data analysis. You will learn to interpret simple outputs from R and write short R codes. While you will be provided with online R modules for the course, you are encouraged to experiment with R beyond the provided modules. R is freely available for download at `http://cran.r-project.org` for Windows, MacOS, and Linux operating systems. We strongly recommend using the University of Toronto JupyterHub `https://r.datatools.utoronto.ca/`, which doesn't require you to download the software, or RStudio Desktop `https://www.rstudio.com/products/rstudio/`.

Communication Policy

You can share questions related to course logistics and course contents using Quercus Discussion Boards. There will be discussion boards set up for each week as well as an overall course logistic discussion board. You are encouraged to share your own answers to the questions. You must NOT share any questions or answers related to any graded assessments: Syllabus Scavenger Hunt, Tutorial Learning Activities, Tutorial Quizzes, and Midterm.

For questions that require private communications, please contact the teaching team at `sta238@course.utoronto.ca` using your UofT email. Emails sent from addresses other than *utoronto.ca* address will be ignored.

Regrading Policy

There will be no regrading for Syllabus Scavenger Hunt.

Grading schemes with sample solutions will be provided for Tutorial Learning Activities, Tutorial Quizzes, and Midterm. These must be reviewed before requesting a reread. If you still have concerns about your grading, fill out the *STA238 Winter 2026 Regrading Request Form*(`https://forms.office.com/r/q029FqbrCn`) to request a reread. You will have up to 1 week after the assessment and solution have been released back to you to submit the requests. Requests outside of this period, without appropriate justifications, or made in any other form will not be considered.

Missed Work and Exceptions

Missing the first tutorial learning activity due to late enrolment

If you miss the first tutorial activity due to late enrolment, your first tutorial learning activity will automatically be reweighted to the remaining activities. The missed activity will not count towards the regular accommodation limit specified below.

Requesting Accommodation due to Exceptional Circumstances

You are given 3 weeks to complete Syllabus Scavenger Hunt. No exception will be granted for missing Syllabus Scavenger Hunt.

If you face exceptional circumstances including medical, personal, family, or other unavoidable reasons and miss a tutorial or the midterm, please fill our the *STA238 Winter 2026 Accommodation Request Form* (`https://forms.office.com/r/LHGawBAqzY`) within 1 week following the assessment deadline. Each request will need **one** of the following supporting documents that covers the date(s) of your missed assessments:

- Absence Declaration form via ACORN in PDF — use "Print Absences" button (see `https://www.artsci.utoronto.ca/current/academics/student-absences`. Note that you can only use the Absence Declaration form once per term.)
- U of T Verification of Illness or Injury Form (VOI) (see `https://registrar.utoronto.ca/policies-and-guidelines/verification-of-illness-or-injury/`)
- College Registrar's letter
- Letter of Academic Accommodation from Accessibility Services

If you miss the form submission deadline, a 0 grade will be assigned for the missed assessment. If you are experiencing exceptional circumstances that will affect your performance in the course in the long term, it is your responsibility to contact and make arrangements with your College Registrar, and inform the teaching team as early as possible.

Requesting Accommodation due to a Schedule Conflict with another Course

Tutorial learning activities and quizzes will not be accommodated for a schedule conflict.

If you need to miss the midterm due to a schedule conflict with another course, please fill out the *STA238 Winter 2026 Request Form for an Exception* by **February 13, 2026** at `https://forms.office.com/r/LHGawBAqzY` and submit **both** of:

- Winter 2026 Timetable via ACORN in PDF — use "Print Timetable" button
- Syllabus of the course in conflict or screenshot of a course document that shows the conflict

Any requests regarding schedule conflicts with the midterm after February 13, 2026 will be ignored.

Accommodations

Because the activities and quizzes are important to the course learning outcomes, **at most two tutorial learning activities** and **at most one tutorial quiz** will be accommodated. Missing the first tutorial activity because you were registered to the class after the tutorial date does not count towards this limit. When the accommodation request is approved, the grades for the missed assessment will be reweighted to the remaining tutorial learning activities and tutorial quizzes respectively. For any subsequent missed activity or quiz, you will receive a grade of 0. Below are examples of grading scheme adjustments for missed tutorial activities and quizzes.

For documented missed midterm, there will be a make-up test. **If you miss the make-up test, you will receive a grade of 0 for the midterm.** If you face exceptional circumstances that prevent you from participating in both the midterm and the make-up, we advise you to seek guidance from your College Registrar.

Final exam conflicts and petitions for a deferred exam must be brought to the Faculty of Arts and Science, not your instructor. Information on how to request a deferred exam due to illness or another valid reason is available at `https://www.artsci.utoronto.ca/current/faculty-registrar/petitions/deferred-exams`.

Academic Integrity

The University of Toronto treats cases of academic misconduct very seriously. Academic integrity is a fundamental value of learning and scholarship at the university. Participating honestly, respectfully,

responsibly, and fairly in this academic community ensures that your degree is valued and respected.

The University of Toronto's Code of Behaviour on Academic Matters `https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019` outlines the behaviours that constitute academic misconduct, the processes for addressing academic offences, and the penalties that may be imposed. You are expected to be familiar with the contents of this document.

Specifically for this course, potential offences include, but are not limited to sharing the assessment questions or discussing your answers on the tutorial learning activities with anyone other than your partner and the teaching team, sharing the assessment questions or discussing your answers on the tutorial quizzes, midterm, or final exam with anyone other than the teaching team, and obtaining unauthorized assistance on the tutorial learning activities/quizzes, midterm, or final exam from online sources, your peers, or tutoring services. You are encouraged to seek assistance from your peers and the teaching team via Quercus Discussion Board or during office hours. You must not share information that directly reveal answers to the assessment questions before the sample solutions are distributed to the class.

All suspected cases of academic dishonesty will be investigated following the procedures outlined in the Code of Behaviour on Academic Matters. If you have any questions about what is or is not permitted in this course, please do not hesitate to contact the teaching team.

Use of Generative AI

The use of generative artificial intelligence tools and apps is strictly prohibited in all course assessments (i.e., tutorial activities quizzes, midterm, and final exam) **unless explicitly stated otherwise** by the course instructors on assessment instructions. This includes ChatGPT and other AI writing and coding assistants. Students may not copy or paraphrase from any generative artificial intelligence applications, including ChatGPT and other AI writing and coding assistants, for the purpose of completing assessments in this course. Use of generative AI in this course is considered use of an unauthorized aid, which is a form of cheating.

Religious Accommodations

As a student at the University of Toronto, you are part of a diverse community that welcomes and includes students and faculty from a wide range of cultural and religious traditions. If you anticipate being absent from class or missing a major course activity due to a religious observance, please let me know as early in the course as possible, and with sufficient notice (at least two weeks), so that we can work together to make alternate arrangements.

Accommodations for Disability

Students with diverse learning styles and needs are welcome in this course. If you have an acute or ongoing disability issue or accommodation need, you should register with Accessibility Services (AS) at the beginning of the academic year by visiting `https://studentlife.utoronto.ca/department/accessibility-services/`. Without registration, you will not be able to verify your situation with your instructors, and instructors will not be advised about your accommodation needs. AS will assess your situation, develop an accommodation plan with you, and support you in requesting accommodation for your course work. Remember that the process of accommodation is private: AS will not share details of your needs or condition with any instructor, and your instructors will not reveal that you are registered with AS.

Mental Health and Well-Being

Your mental health is important. Throughout university life, there are many experiences that can impact your mental health and well-being. As a University of Toronto student, you can access free mental health and wellness services at Health & Wellness (`https://studentlife.utoronto.ca/department/health-wellness/`) such as same day counselling, brief counselling, medical care, skill-building workshops, and drop-in peer support. You can also meet with a Wellness Navigation Adviser who can connect you with other campus and community services and support. Call the mental health clinic at 416-978-8030 ext. 5 to book an appointment or visit `https://uoft.me/mentalhealthcare` to learn about the services available to you.

You can also visit your College Registrar to learn about the resources and supports available: `https://www.artsci.utoronto.ca/current/academic-advising-and-support/college-registrars-offices`

If you're in distress, you can access immediate support: `https://uoft.me/feelingdistressed`

Intellectual Property Statement

Course material - including but not limited to lecture slides, assessment questions, and other supplementary course material available on Quercus - is the intellectual property of the teaching team and is made available to you for your personal use in this course. Sharing, posting, selling, or using this material outside of your personal use in this course is **not** permitted under any circumstances and is considered an infringement of intellectual property rights.

Course Schedule

Below is a tentative weekly schedule by topic. The details may change during the term.

Week	Dates	Topic
1	Jan 5 - Jan 9	Introduction Numerical EDA
2	Jan 12 - Jan 16	Numerical EDA (continued) Graphical EDA
3	Jan 19 - Jan 23	Graphical EDA (continued) Statistical modelling and approximations
4	Jan 26 - Jan 30	Estimators and their distributions
5	Feb 2 - Feb 6	Methods of estimation
6	Feb 9 - Feb 13	Methods of estimation (continued) Maximum likelihood estimation
7	Feb 16 - Feb 20	*Reading week*
8	Feb 23 - Feb 27	Bootstrapping in R *Midterm*
9	Mar 2 - Mar 6	Confidence intervals
10	Mar 9 - Mar 13	Hypothesis testing
11	Mar 16 - Mar 20	Goodness of fit Introduction to Bayesian inference
12	Mar 23 - Mar 27	Estimation in Bayesian inference
13	Mar 30 - Apr 3	Introduction to linear models Wrap-up