

UNIVERSITY OF TORONTO
DEPARTMENT OF STATISTICAL SCIENCES
STA238H1S LEC0101/LEC0201/LEC0301/LEC5101
(Probability, Statistics and Data Analysis II), Winter 2023

1 COURSE DESCRIPTION

Syllabus: An introduction to statistical inference and practice. Statistical models and parameters, estimators of parameters and their statistical properties, methods of estimation, confidence intervals, hypothesis testing, likelihood function, the linear model. Use of statistical computation for data analysis and simulation.

Note: Important announcements, class problem sets, tutorial problem sets, modules, and other course information will be regularly posted on the course web page of Quercus. It is an online platform to learn effectively this course.

Prerequisite: STA237H1/ STA247H1/ STA257H1/ STAB52H3/ STA256H5

Exclusion: ECO220Y1/ ECO227Y1/ GGR270H1/ PSY201H1/ SOC300H1/ SOC202H1/ SOC252H1/ STA220H1/ STA221H1/ STA255H1/ STA248H1/ STA261H1/ STA288H1/ EEB225H1/ STAB22H3/ STAB27H3/ STAB57H3/ STA220H5/ STA221H5/ STA258H5/ STA260H5/ ECO220Y5/ ECO227Y5

Breadth Requirements: The Physical and Mathematical Universes (5)

2 COURSE SCHEDULE

We will use the scheduled lecture and tutorial times for each section.

Activity	Section			
	LEC0101	LEC0201	LEC0301	LEC5101
Lecture time	Monday 9am - 11am, Wednesday 9am - 10am	Monday 1pm - 3pm Wednesday 1pm - 2pm	Tuesday 4pm - 6pm Thursday 4pm - 5pm	Tuesday 7pm - 9pm Thursday 6pm - 7pm
Lecture room	(WB 116)	(WB 116)	(PB B250)	(MS 3154)
Tutorial time	Wednesday 10am - 11am	Wednesday 2pm - 3pm	Thursday 5pm - 6pm	Thursday 7pm - 8pm
Tutorial room	SF 3202 for TUT0101 GB 119 for TUT0102 GB 221 for TUT0103 GB 248 for TUT0104	GB 221 for TUT0201 GB 244 for TUT0202 GB 248 for TUT0203 WB 119 for TUT0204	GB 248 for TUT5101 GB 244 for TUT5102 WB 119 for TUT5103 AB 107 for TUT5104	GB 220 for TUT5201 GB 221 for TUT5202 GB 244 for TUT5203 GB 248 for TUT5204

Note: The first tutorial session will be commenced after 22 January, 2023. R programming language will be mainly taught during tutorial sessions.

3 INSTRUCTOR

Selvakkadunko Selvaratnam (Selva)

Email for this course: sta238@utoronto.ca

PhD in Statistics, Memorial University of Newfoundland

Assistant Professor (teaching stream), Department of Statistical Sciences, University of Toronto.

4 OFFICE HOURS

Office hours will be posted on Quercus, held via Microsoft Teams or Zoom and links will be provided on Quercus.

5 TEXTBOOK

- (1) A Modern Introduction to Probability and Statistics: Understanding Why and How, 2005, by Dekking, F.M., Kraaikamp, C., Lopushaä, H.P., and Meester, L.E.
You can access a digital textbook from the online library of the University of Toronto by clicking https://librarysearch.library.utoronto.ca/discovery/fulldisplay?context=L&vid=01UTORONTO_INST:UTORONTO&%20search_scope=UTL_AND_CI&tab=Everything&docid=alma991106910545806196
- (2) Modern Mathematical Statistics with Applications, 2021, by Devore, J.L., Berk, K.N., Carlton, M.A.
You can access a digital textbook from the online library of the University of Toronto by clicking <https://link-springer-com.myaccess.library.utoronto.ca/book/10.1007%2F978-3-030-55156-8>
- (3) Mathematical Statistics with Applications, 7th Edition, by Wackerly, D. D, Mendenhall, W., Scheaffer, R. L.
- (4) Introduction to Scientific Programming and Simulation using R by Jones, O., Maillardet, R., Robinson, A.

6 COURSE STRUCTURE

Quercus Page: All lecture slides, assignments, class and tutorial activities and other course materials will be posted on Quercus under Modules. Course materials provided on Quercus are for the use of students currently enrolled in this course only. Distributing course materials to anyone outside of the course is considered unauthorized use.

Assignments/Class activities/Tutorial activities: Answers for Assignments/Class activities/Tutorial activities must be submitted on Crowdmark.

- Assignments, class and tutorial activities submitted in other ways (e.g. over email) will not be accepted. There are no make-up assignments/class activities/tutorial activities.
- A penalty of 5% for every hour will be provided for a late assignment. For example, if an assignment submitted 10 minutes after the due date and time, there would be a penalty of 5% on the assignment grade (i.e. 90% → 85.5%).

Assignments: Students must upload each question of an assignment on the appropriate section of Crowdmark by 5:00pm on their respective due dates.

Class activities: Marks will be assigned for class activities. You must submit your works for class activities on Crowdmark. The instructions that includes deadlines will be provided on Crowdmark for each week.

Tutorial activities: Marks will be assigned for tutorial activities. You must submit your works for tutorial activities on Crowdmark. The instructions that includes deadlines will be provided on Crowdmark for each week.

Midterm exam: The midterm exam will cover course materials that we would learn before the midterm exam. The duration of the midterm exam will be 90 minutes. The midterm exam will be held during the class time and details can be found in the section “**Evaluation**”.

Final exam: The final exam will cover all course materials and the duration of the final exam will be 3 hours. Also, the final exam will be scheduled and conducted by the Faculty of Arts and Science during the final assessment period (i.e., April).

7 EVALUATION

The final course marks will be computed by the following methods.

Type of assessment	Weight of total marks	Due date
Assignment 1	6%	Friday, February 10 at 5.00pm
Assignment 2	6%	Friday, March 17 at 5.00pm
Assignment 3	7%	Monday, April 3 at 5.00pm
Class activities (Top 7 of 9 class activities)	$(7 \times 1.5\% =)$ 10.5%	During lectures
Tutorial activities (Top 7 of 9 tutorial activities)	$(7 \times 1.5\% =)$ 10.5%	During tutorials
Midterm Exam	20%	Monday, Feb. 27, 9am - 11am for LEC0101, Room: TBD Monday, Feb. 27, 1pm - 3pm for LEC0201, Room: TBD Tuesday, Feb. 28, 4pm - 6pm for LEC0301, Room: TBD Tuesday, Feb. 28, 7pm - 9pm for LEC5101, Room: TBD
Final Exam	40%	TBD, will be held during the final assessment period

8 TENTATIVE LECTURE GUIDE

	Dates		Topics
1	Jan. 9 - 13	Module 1	Course Introduction and Sampling Distributions
2	Jan. 16 - 20	Module 2	Point Estimation - Part 1
3	Jan. 23 - 27	Module 3	Statistical Intervals Based on a Single Sample
4	Jan. 30 - Feb. 3	Module 4	Tests of Hypotheses Based on a Single Sample - Part 1
5	Feb. 6 - 10	Module 5	Tests of Hypotheses Based on a Single Sample - Part 2
6	Feb. 13 - 17	Module 6	Inferences Based on Two Samples - Part 1
7	Feb. 20 - 24		Reading Week
8	Feb. 27 - Mar. 3		Midterm Exam and Module 6
9	Mar. 6 - 10	Module 7	Inferences Based on Two Samples - Part 2
10	Mar. 13 - 17	Module 8	Point Estimation - Part 2
11	Mar. 20 - 24	Module 9	Regression and Correlation
12	Mar. 27 - 31	Module 10	The Analysis of Variance
13	Apr. 3 - 6	Module 11	Time Permitting: Logistic Regression

9 MISSED COMPONENTS

Midterm Exam: There will be no make-up midterm exam. If you miss the midterm exam, then complete the absence declaration on ACORN instead of emailing me. If you complete the absence declaration, the weight of your missed midterm will be shifted to your final exam (i.e., your final will be worth 60% instead of 40%).

Assignments: Assignments must be submitted on Crowdmark by the deadlines and that there are no extensions or make-ups for assignments. Students must complete the absence declaration on ACORN instead of emailing me within one week of the assignment deadline to request accommodation for a missed assignment, in which case, its weight will be equally distributed across your midterm and final exam.

Note: At most one missed assessment (either an assignment or a midterm) can be added to the percentage of the final exam.

Class activities: Top 7 of 9 class activities will be recorded.

Tutorial activities: Top 7 of 9 tutorial activities will be recorded.

Final exam: If students miss the final exam, they will need to submit a petition for a deferred final exam through the Faculty of Arts and Science (see <https://www.artsci.utoronto.ca/current/faculty-registrar/petitions/deferred-exams>).

10 REGRADE POLICY

Midterm/Assignments/Class activities/Tutorial activities: Firstly, you should review marking schemes/solutions before requesting a reread. If you still have concerns about your grading, complete “Term Assessment Regrade form” that will be posted on Quercus and send it to me through email no later than 1 week after an assessment has been released back to you. Late requests will not be accepted. Note that your grade may increase, stay the same, or it may go down based on the regrade.

Final examination view and regrade: Details can be found in <https://www.artsci.utoronto.ca/current/faculty-registrar/exams-assessments/exam-viewing> and <https://www.artsci.utoronto.ca/current/faculty-registrar/exams-assessments/exam-recheck-or-reread>

11 IMPORTANT DATES

First day of classes	January 9, 2023
Last day to enrol a program	January 22, 2023
Family Day - University closed	February 20, 2023
Reading week	February 20 - 24, 2023
Last day to drop S courses	March 19, 2023
Last day of classes	April 6, 2023
Final assessment periods	April 11 - 28, 2023

12 COURSE CONDUCT

- **Email:** Any administrative questions regarding the course can be addressed by me via email (sta238@utoronto.ca). Questions regarding course materials and concepts should be addressed by office hours/Piazza.

All students are given a UToronto email address. This email address is available to the course instructor who may distribute relevant course information or announcements via email. The University regularly communicates with students via email. Check your UToronto email regularly or forward it to an email address that you check regularly. If you use email to communicate with your instructor, you must use your UToronto account. This is to protect your privacy: if a non-UToronto account is used, there is no way for the instructor to verify the identity of the sender.

- **Programming Languages:** RStudio (free download from <https://www.rstudio.com/>), statistical software, will be taught. Also, you can use a cloud-based version of RStudio at University of Toronto by using the link: <https://jupyter.utoronto.ca/>. Instructions using RStudio will be provided during tutorial sessions, and initial codes will be provided where appropriate. By the end of the course, you are expected to apply RStudio to solve problems.
- **Recording and/or Distribution of Course Materials:** Audio or video recording, digital or otherwise, of lectures, or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan. Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the content author(s).

13 ACCESSIBILITY SERVICES

The University of Toronto provides accommodations through accessibility services to students with diverse learning styles and needs. If you have a disability or health consideration that may require accommodations, please feel free to reach out to Accessibility Services at 416-978-8060 or through accessibility.services@utoronto.ca

14 STUDENT RESPONSIBILITIES

Academic Integrity: Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that the University of Toronto degree that you earn will be valued as a true indication of your individual academic achievement, and will continue to receive the respect and recognition it deserves. Familiarize yourself with the University of Toronto's Code of Behaviour on Academic Matter. Potential offences including, but not limited to:

- Obtaining or providing unauthorized assistance on any exam/assignment including:
 - (i) working in groups on individual assessments, including giving hints to the answer
 - (ii) having someone rewrite, edit, or add material to your independent work
 - (iii) researching for inspiration, hints, or answers to any graded problem
 - (iv) posting active assessment questions on discussion boards/private tutoring companies for hints/solutions
- Lending your work to a classmate who submits it as their own with or without your permission. The University of Toronto treats cases of academic misconduct very seriously. All suspected cases of academic dishonesty will be investigated following the procedures outlined in the Code. The consequences for academic misconduct can be severe, including a failure in the course and a notation on your transcript. If you have any questions about what is or is not permitted in this course, please do not hesitate to contact the instructor. If you are experiencing personal challenges that are having an impact on your academic work, please speak to the instructor or seek the advice of your college registrar.