

**UNIVERSITY OF TORONTO
DEPARTMENT OF STATISTICAL SCIENCES**

STA237H1 F LEC0101/LEC0201/LEC0301 (Probability, Statistics and Data Analysis I), Fall 2022

1 COURSE DESCRIPTION

Syllabus: An introduction to probability using simulation and mathematical frameworks, with emphasis on the probability needed for more advanced study in statistical practice. Topics covered include probability spaces, random variables, discrete and continuous probability distributions, probability mass, density, and distribution functions, expectation and variance, independence, conditional probability, the law of large numbers, the central limit theorem, sampling distributions. Computer simulation will be taught and used extensively for calculations and to guide the theoretical development.

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: (MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1/(MATA30H3, MATA36H3)/
(MATA31H3, MATA37H3)/(MAT135H5, MAT136H5)/MAT137Y5/MAT157Y5

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
Lecture time	Tuesday 9am - 11am and Thursday 10am - 11am	Tuesday 1pm - 3pm and Thursday 1pm - 2pm	Wednesday 1pm - 3pm and Friday 2pm - 3pm
Lecture room	(WB 116)	(BA 1160)	(BA 1160)
Tutorial time	Thursday 9am - 10am	Thursday 2pm - 3pm	Friday 1pm - 2pm
Tutorial room	GB 248 for TUT0101 WB 119 for TUT0102 GB 304 for TUT0103 AB 107 for TUT0104	GB 221 for TUT0201 GB 244 for TUT0202 SF 3202 for TUT0203 WW 126 for TUT0204	GB 303 for TUT0301 SF 2202 for TUT0302 WB 219 for TUT0303 AB 107 for TUT0304

Note: The first tutorial session will be commenced on 22 September, 2022 for groups under LEC0101 and LEC0201 section and 23 September, 2022 for groups under LEC0301 section. R programming language will be mainly taught during tutorial sessions.

3 INSTRUCTOR

Selvakkadunko Selvaratnam (Selva)

Email for this course: sta237@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) PROBABILITY With Applications and R, 2021, by Wagaman, A. S., and Dobrow, R. P.
- (2) A Modern Introduction to Probability and Statistics: Understanding Why and How, 2005, by Dekking, F.M., Kraaikamp, C., Lopuhaä, 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

- (3) 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>

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 should 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 before 9pm on that day of class. The instructions will be given on Crowdmark for each week.

Tutorial activities: Marks will be assigned for tutorial activities. You must submit your works for tutorial activities on Crowdmark before 9pm on that day of tutorial. The instructions will be given 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 2 hours. The midterm exam will be held in the classroom 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., December).

7 EVALUATION

The course mark will be computed by the following methods.

Type of assessment	Weight of total marks	Due date
Assignment 1	6%	Friday, October 14 at 5.00pm
Assignment 2	6%	Tuesday, November 15 at 5.00pm
Assignment 3	7%	Friday, December 2 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%	Tuesday, Oct. 25, 9am - 11am for LEC0101, Room: TBD Tuesday, Oct. 25, 1pm - 3pm for LEC0201, Room: TBD Wednesday, Oct. 26, 1pm - 3pm for LEC0301, Room: TBD
Final Exam	40%	TBD, will be held during the final assessment period

8 TENTATIVE LECTURE GUIDE

	Dates	Topics
1	Sep. 8 - 14	Introduction to the course, Outcomes, events and probability
2	Sep. 15 - 21	Conditional probability and independence
3	Sep. 22 - 28	Discrete random variables and their probability distributions
4	Sep. 29 - Oct. 5	Discrete random variables and their probability distributions
5	Oct. 6 - 12	Continuous random variables and their probability distributions
6	Oct. 13 - 19	Continuous random variables and their probability distributions
7	Oct. 20 - 26	Multivariate probability distributions
8	Oct. 27 - Nov. 2	Functions of random variables
9	Nov. 3 - 16	Functions of random variables
10	Nov. 17 - 23	Sampling distributions and the central limit theorem
11	Nov. 24 - 30	The law of large numbers
12	Dec. 1 - 8	The bootstrap Method

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	September 8, 2022
Last day to enrol a program	September 21, 2022
No classes - Thanksgiving holiday	October 10, 2022
Reading week	November 7 - 11, 2022
Last day to drop F courses	November 16, 2022
Last day of classes	December 8, 2022 (Monday schedule)
Study day	December 9, 2022
Final exam periods	December 10 - 20, 2022

12 COURSE CONDUCT

- **Email:** Any administrative questions regarding the course can be addressed by me via email (sta237@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.