UNIVERSITY OF TORONTO
DEPARTMENT OF STATISTICAL SCIENCES
STA237H1 F LEC0101/LEC5101 (Probability, Statistics and Data Analysis I), Fall 2021

All listed times in this document are in local Toronto time. If you are in a different time zone, you are responsible for any time conversions.

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.

Important announcements, problem sets, additional examples, and other course information will be posted on the course web page on Quercus. It is an online platform to learn this course effectively.

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 times Tuesdays 3-5pm for LEC0101 and Thursdays 6 - 8 pm for LEC5101. Lectures will be delivered online and tutorials will be offered in-person or online depending on the tutorial section in which you enrol. All assessments will be completed online. Lectures will be held via Microsoft Teams and this link is posted on Quercus page.

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:

Will be posted on Quercus, held via Microsoft Teams and the link will be available on Quercus.

5 TEXTBOOK

(1) A Modern Introduction to Probability and Statistics: Understanding Why and How, 2005, by Dekking, F.M., Kraaikamp, C., Lopuhaa, H.P., and Meester, L.E.

You can access a digital textbook form 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) Students may use this following text book for additional practice problems:
Probability: With Applications and R, 2021, by Wagaman, A. S., and Dobrow, R. P.

6 COURSE STRUCTURE

Quercus Page: All lecture slides, video recordings, quizzes/tests/assignments, 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: Assignments will be submitted through Crowdmark.

- 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%).

- Students should upload each question of the assignment on the appropriate section of Crowdmark by 1700 (5:00pm) on their respective due dates.

Quizzes: will be held during lecture sessions. The duration of each quiz will be 45 minutes. Each quiz will be started at the beginning of lecture session.

Tutorials: will start on 23 September 2021 Thursdays 3-5pm for LEC0101 and Thursdays 8-10pm for LEC5101. Marks will be assigned for tutorial activities. You should post your works of tutorial activities on Crowdmark within 30 minutes from the end of each tutorial session.

7   TENTATIVE LECTURE GUIDE

	Dates	Topics
1	Sep. 9 - 15	Introduction to the course, Outcomes, Events and Probability
2	Sep. 16 - 22	Conditional Probability & Independence, The Law of Total Probability
3	Sep. 23 - 29	Discrete Random Variable, Discrete Distributions: Bernoulli, Binomial and Poisson
4	Sep. 30 - Oct. 6	Continuous Random variable, Continuous Distributions: Uniform, Exponential, Normal
5	Oct. 7 - 13	Normal Distribution and Properties, Normal Approximation to Binomial Distribution
6	Oct. 14 - 27	Joint distribution and Independence
7	Oct. 28 - Nov 3	Method of Transformations
8	Nov. 4 - 17	Law of Large Number and Simulating Random variables
9	Nov. 18 - 24	Sampling Distributions and Simulating Sampling Distribution
10	Nov. 25 - Dec. 1	Central Limit Theorem and its applications
11	Dec. 2 - 7	Central Limit Theorem and its applications and Final Review

8   EVALUATION

The course mark will be computed based on the following method,

Types	Weight of total marks	Date
Assignment 1	8%	Friday, October 15 at 5.00pm
Assignment 2	8.5%	Wednesday, December 1 at 5.00pm
Quiz 1	5%	September 28, 3-3.45pm for LEC0101 September 30, 6-6.45pm for LEC5101
Quiz 2	5%	October 5, 3-3.45pm for LEC0101 October 7, 6-6.45pm for LEC5101
Quiz 3	5%	November 2, 3-3.45pm for LEC0101 November 4, 6-6.45pm for LEC5101
Quiz 4	5%	November 16, 3-3.45pm for LEC0101 November 18, 6-6.45pm for LEC5101
Tutorial Activities (9)	$(9 \times 1.5\% =)$ 13.5%	During tutorial session
Midterm Exam	20%	Tuesday, October 19, 3 - 5pm for LEC0101 Thursday, October 21, 6 - 8pm for LEC5101
Final Exam	30%	TBD, will be held during the Final Examination Period

9   MISSED COMPONENTS

Term Exams and Assignments: There are no deferred term exams or term assignments. Final exam will cover the entire course. There will be no make-up midterm exam or assignments or quizzes or tutorials. Students who miss any term exams or term assignments for a valid reason, will have the percentage of this assessment added to the percentage of the final exam. **At most one missed**

assessment can be added to the percentage of the final exam. But, you should email to me within one week from the date of the assessment.

10   IMPORTANT DATES

First Day of Classes	September 9
Fall Reading Week	November 8 - 12
Last Day of Classes	December 8
Final Exam Periods	December 10 - 21

11   COURSE CONDUCT

- **Email:** Any administrative questions regarding the course can be addressed by me via email (sta237@utoronto.ca). Questions regarding course material and concepts should be addressed in 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 regularly used. Instructions using RStudio will be provided during lecture sessions, and initial codes will be provided where appropriate. By the end of the course, you are expected to run simple simulations on your own, write your own functions, and more generally, understand how various R codes works, apply and adapt them to solve problems.

- **Recording and/or Distribution of Course Materials:** Audio or video recording, digital or otherwise, of lectures, tutorials, seminars 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).

12   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.utoronto.ca.

13 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 include, but are not limited to:

- Obtaining or providing unauthorized assistance on any test/assignment/tutorial 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.

Collaboration on Assignments: Every term there are several students who receive academic penalties for copying assignments. Here are some tips to avoid copying on assignments:

- Do not write down something that you cannot explain to your TA or instructor.

- When you are helping other students, avoid showing them your work directly. Instead, explain your solution verbally. Students whose work is copied also receive academic sanctions.

- If you find yourself reading another student's solution, do not write anything down. Once you understand how to solve the problem, remove the other person's work from your sight and then write up the solution to the question yourself. Looking back and forth between someone else's paper and your own paper is almost certainly copying and will result in academic sanctions for both you and your fellow student.

- If the instructor or TA writes down part of a solution in order to help explain it to you or the class, you cannot copy it and hand it in for credit. Treat it the same way you would treat another student's work with respect to copying, that is, remove the explanation from your sight and then write up the solution yourself.

- There is often more than one way to solve a problem. Choose the method that makes the most sense to you rather than the method that other students happen to use. If none of the ideas in your solution are your own, there is a good chance it will be flagged as copying.

14 DISCLAIMER

Any typographical errors in this Course Outline are subject to change and will be announced in class. The date of the final examination is set by Faculty of Arts and Science and it will be announced later.