

University of Toronto
Department of Statistical Sciences
STA257HF LEC5101
Probability and Statistics I

Course Outline - Summer 2021

Lectures

TU 6:00 pm – 9:00 pm
TH 6:00 pm – 9:00 pm

Instructor Office Hours

TU 4:00 pm – 5:00 pm
TH 4:00 pm – 5:00 pm

Tutorials

TU 5:00 pm – 6:00 pm
TH 5:00 pm – 6:00 pm

Lectures and office hours will be conducted via Zoom. Zoom link and password will be announced on Quercus. Lectures will be online synchronous starting 10 minutes after the scheduled time. Lectures will be recorded and then posted on Quercus. Students should log into Zoom from the U of T Zoom Portal (<https://utoronto.zoom.us>).

As this is an online course and all assessments must be submitted through [crowdmark/Quercus](#), it is the STUDENTS' responsibility to ensure they have a reliable Internet connection.

Instructor: Luai Al Labadi

E-mail: luai.allabadi@utoronto.ca [only for private matters, including missed assessments and re-marking requests]

Course website: All materials will be posted on Quercus <https://q.utoronto.ca>. Be sure to check the site regularly! It is **your** responsibility to know what has been posted.

Teaching Assistants: TBA on Quercus

Tutorials: Tutorials will start on the second week (i.e., May 11th) and run until the last week of class. Assignment problems will serve as an appropriate preparation for the tutorial discussions.

Course Description: A mathematically rigorous introduction to probability, with applications chosen to introduce concepts of statistical inference. Probability and expectation, discrete and continuous random variables and vectors, distribution and density functions, the law of large numbers. The binomial, geometric, Poisson, and normal distributions. The Central Limit Theorem. (Note: STA257H1 does not count as a distribution requirement course).

Prerequisite: (MAT135H1 (70%), MAT136H1(70%))/MAT137Y1/MAT157Y1 (MAT137Y1/MAT157Y1 is strongly recommended) /MATA36H3(70%)/MATA37H3/MAT135Y5(70%)/MAT137Y5/MAT157Y5

Corequisite: MAT235Y1/MAT237Y1/MAT257Y1 (MAT237Y1/MAT257Y1 is strongly recommended)/MATB41H3/MAT232H5/ MAT233H5; MAT223H1/MAT240H1/MATA23H3/MAT223H5/MAT240H5

Exclusion: ECO227Y1, STA237H1, STA247H1, MAT377H1, STAB52H3, STA256H5, ECO227Y5

Breadth Requirement: The Physical and Mathematical Universes (5)

Learning Outcomes: By the end of this course, all students should understand the concepts above and be prepared to show their understanding in the following ways:

- be able to solve straightforward problems regarding the material,
- be able to approach an unfamiliar problem and recognize how it is solved by an extension of the material presented during lectures,
- be able to prove results that are extensions of those shown in class,
- be able to explain concepts in non-technical language and understand common misconceptions of these concepts.

Course Materials

Textbook: *Probability and Statistics: The Science of Uncertainty* (2nd edition) by Michael J. Evans and Jeffrey S. Rosenthal. (This book has been made available for free by the authors.)

Topics: Ch.1 - Ch.4 (Probability, Discrete random variables, Continuous random variables, Joint distribution, Expectation, Variance, Covariance, Moment-generating function, Convergence, Sampling distributions)

Additional References: *Mathematical Statistics and Data Analysis* by John Rice, 3rd edition.

Calculators: Handheld, non-programmable calculators may be used during quizzes and tests. Any calculator that has a logarithm, square root, and one memory button will suffice for this course, so there is no need to buy an expensive calculator.

Assessment and Test Dates

Type	Due Date	Weight
Quizzes	May 11, May 13, May 18, June 1, June 8	5*10%=50%
Midterm	May 25	20%
Final assessment	(will cover everything taught in the course; date and time will be fixed by the Faculty of Arts and Science)	30%

Quizzes

- The quizzes are designed to help you keep up with course material.
- There will be 5 quizzes in total.
- Each quiz will worth 10%.
- The coverage of each quiz will be posted on [Quercus](#).
- Quizzes are open book: *Probability and Statistics: The Science of Uncertainty*.
- Quizzes will be administered using [crowdmark/Quercus](#). Details will be posted on Quercus.
- Late submissions will not be accepted.
- Solutions submitted via emails will not be accepted.
- You cannot base your justification on any procedure/fact that is not covered in the lecture notes.

Date and Time

Quiz 1	May 11: 8-9 pm
Quiz 2	May 13: 8-9 pm
Quiz 3	May 18: 8-9 pm
Quiz 4	June 1: 8-9 pm
Quiz 5	June 8: 8-9 pm

Midterm

- The midterm test starts at 7:30 pm and end at 9:00 pm on May 25. This includes the time needed to upload your solutions.
- Coverage will be posted on Quercus.
- The midterm test will be held on [crowdmark](#). Details will be posted on Quercus.
- Quizzes are open book: *Probability and Statistics: The Science of Uncertainty*.
- Late submissions will not be accepted.
- Solutions submitted via emails will not be accepted.
- You cannot base your justification on any procedure/fact that is not covered in the lecture notes.

Final Assessment

- Duration: 3 hours.
- It will be held on [crowdmark](#).
- It will cover all material throughout the term. Details will be posted on Quercus.

Missed Assessment: There are NO make-up assessments of any form except for the final assessment.

- Taking the final assessment is mandatory for every student.
 - Students who miss the final assessment due to illness or another legitimate reason are required to email the instructor within **one** week of the final assessment to request accommodation. 0% will be recorded for a missed final assessment otherwise.
 - If accommodation is granted for a missed final assessment, an alternative assessment will be arranged at the instructor's discretion. Note that this alternative assessment may have a different format (e.g., oral assessment) and may be scheduled later in the summer.
- For the rest of the assessments (Quizzes and Midterm): Quizzes and midterm have been planned to help keep you on track in the course, so it is important that you complete everything at the scheduled times. However, you may need to miss an assessment due to illness or another legitimate reason sometime during the term. There are **no** make-ups or extensions for these assessments, but the grading scheme has been designed to accommodate a small number of these missed assessments automatically as follows:
 - A student is only allowed to miss assessments (Quizzes and Midterm) worth up to a total of no more than 30% toward their course grade, irrespective of reason missed. Students are not required to submit any doctor's note for their missed assessment.
 - The weight of the missed work (up to 30%) will automatically be proportionately distributed among the other assessments.
 - A student missing assessments worth a total of more than 30% toward the course grade, irrespective of reason missed, will not pass this course as it is not possible to award a meaningful grade with such a substantial amount of course work missed.

Re-mark Policy

If you feel that there is an issue with the marking of a test, you may request it to be re-marked. The course re-mark policy exists to correct mistakes, and any request should clearly identify the error (for example, a question that was

not marked, or a total incorrectly calculated). Requests to correct such mistakes must be sent by email to your instructor and **NOT** to the TA.

In order to be considered for a remarking request, your email

- 1) must be received within 5 business days of the date of when the graded test was first available;
- 2) must include STA257 in the subject line of the email, must include your full name and student ID number, and must give a specific, clear, and concise reason for each request, referring to a possible error or omission by the marker. Remarking requests without a specific reason will not be accepted.
- 3) Note that your entire test may be remarked when submitting a remarking request. So, it is possible that your assessment grade to go down if the regraded mark is lower than your original assessment grade.

Homework/Practice Problems: There will be weekly homework assignments. They will be taken up in tutorial, but they will not be handed in. Homework assignments are designed to assist in your preparation for the quizzes, the midterm, and the final assessment. Test and exam questions will correlate strongly with those given on your homework. An approach which your instructor tries to follow is that if an idea or method is required to do the homework then you are completely responsible for it.

Piazza: This is for student-led discussion. Instructors and TA's will check Piazza posts on a regular basis and might participate in discussions. Please do not email questions about course content to instructors or your TA! Instead, post your question in Piazza. Here is the link to our course (Access Code: STA257):

Signup Link: piazza.com/utoronto.ca/summer2021/sta257h1flec5101

Privacy and Use of Course Materials Notifications: This course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session. Course videos and materials belong to your instructor, the University, and/or other source depending on the specific facts of each situation, and are protected by copyright. In this course, you are permitted to download session videos and materials for your own academic use, but you should not copy, share, or use them for any other purpose without the explicit permission of the instructor. For questions about recording and use of videos in which you appear please contact your instructor.

Email Policy: In online course, most of communications are visible to all. However, when you have a necessity to communicate with your instructor in private, you may do it by email. Your email must originate from your University of Toronto email account when you contact your instructor by email. The subject

line should contain the course number and a relevant subject (indicating what the email is about). Be sure to include your full name and student ID number in the body of the message. You will not get a response if you send your email from other email addresses or do not follow the email policy.

Before you send an email, make sure that you are not asking for information that is already available from the course outline/website/announcements, or questions about the course material that are more appropriate for discussing during office hours or discussion board on Piazza. If you do not get a response, this may well be a reason. **In general, your instructor is unable to answer technical questions about the course material by email.**

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 classroom, or course materials, please contact Accessibility Services as soon as possible at accessibility.services@utoronto.ca or <http://www.accessibility.utoronto.ca>.

Academic Integrity: Academic integrity is fundamental to learning and scholarship at the University of Toronto. 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 Matters available at (<https://www.academicintegrity.utoronto.ca/perils-and-pitfalls/>)

By offering students the opportunity to learn remotely, students are expected to maintain the same academic honesty and integrity that they would in a classroom setting. Potential academic offences in a digital context include, but are not limited to:

1. Accessing unauthorized resources (search engines, chat rooms, Reddit, tutoring services, etc.) for assessments.
2. Using technological aids (e.g. software) beyond what is listed as permitted in an assessment.
3. Posting test, essay, or exam questions to message boards or social media.
4. Creating, accessing, and sharing assessment questions and answers in virtual “course groups.”
5. Working collaboratively, in-person or online, with others on assessments that are expected to be completed individually.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources.

Tentative Course Schedule

Lecture	Date	Topics	Assignment #
1	May 4	Set notation, Venn diagrams, Foundations of probability, Rules of probability	1: Sec 1.2-1.3
2	May 6	Counting principles, Conditional probability, Bayes' rule, Independence;	2: Sec 1.4-1.5
3	May 11	Discrete random variables and distributions; Quiz 1	3: Sec 2.1-2.3
4	May 13	Continuous random variables and distributions; Quiz 2	4: Sec 2.4-2.5
5	May 18	Joint distributions, multinomial distribution; Quiz 3	5: Sec 2.7
6	May 20	Conditional Distributions, Independent random variables, Order statistics	6: Sec 2.8
7	May 25	Midterm Exam	-
8	May 27	Transformations of jointly distributed random variables	7: Sec 2.9
9	June 1	Expectation, variance, covariance, correlation, conditional expectations; Quiz 4	8: Sec 3.1-3.3
10	June 3	Moment generating functions	9: Sec 3.4
11	June 8	Limit Theorems, law of Large Numbers, Convergence; Quiz 5	10: Sec 4.2, Sec 4.4 and Sec 4.6
12	June 10	Central Limit Theorem, Distributions derived from Normal	