DEPARTMENT OF MATHEMATICAL AND COMPUTATIONAL SCIENCES
UNIVERSITY OF TORONTO MISSISSAUGA

STA256H5F LEC0102
Probability and Statistics I
Course Outline - Fall 2024

Class Location & Time	Mon, 02:00 PM - 03:00 PM MN 1210 Wed, 01:00 PM - 03:00 PM DV 2074 Sat, 10:00 AM - 12:00 PM ZZ TBA
Instructor	Masoud Ataei
Office Location	DH 3033
Office Hours	TBA
E-mail Address	masoud.ataei@utoronto.ca
Course Web Site	https://q.utoronto.ca/courses/367205
Co-Instructor	Omidali Aghababaei Jazi
E-mail Address	omid.jazi@utoronto.ca
Co-Instructor	Nishan Mudalige
E-mail Address	nishan.mudalige@utoronto.ca

Course Description

This course covers probability including its role in statistical modeling. Topics include probability distributions, expectation, discrete and continuous random variables and vectors, distribution functions, distributions of functions of random variables, limit theorems, the central limit theorem.

Prerequisite:

MAT134H5 or MAT136H5 or MAT137Y5 or MAT139H5 or MAT157Y5 or MAT159H5 or a minimum 65% in MAT133Y5

Exclusion:
ECO227Y5 or STA257H1 or ECO227Y1 or STAB52H3

Recommended: MAT232H5 or MAT233H5 (SCI)
Distribution Requirement: SCI

Students who lack a pre/co-requisite can be removed at any time unless they have received an explicit waiver from the department. The waiver form can be downloaded from here.

Detailed Course Description

Delivery Mode: This course is to be delivered **in person** as specified on the University TIMETABLE website. In case there is any change in the mode of delivery, the details will be announced on the course website.

Tutorials and TA Information: Tutorials will be held **in person** every week from the second week. Tutorials will be administered by the TAs to review topics, solve problems and answer questions. The TAs' contact information and office hours will be posted on the course website.

Textbooks and Other Materials

Textbook: Introduction to Mathematical Statistics (8th Edition) by Rober V. Hogg, Joseph W. McKean and Allen T. Craig, 2019.

Additional References:

Probability and Statistics: The Science of Uncertainty (2nd Edition) by Michael J. Evans and Jeffrey S. Rosenthal, 2010.

Mathematical Statistics with Applications (7th Edition) by Wackerly, Mendenhall and Scheaffer, 2008.

Assessment and Deadlines

Type	Description	Due Date	Weight
Quiz	Online, every two weeks (starting 2nd week) on Quercus	On-going	20%
Term Test	In-person, 10:00 AM-12:00 PM	2024-10-05	20%
Term Test	In-person, 10:00 AM-12:00 PM	2024-11-09	20%
Final Exam	December	TBA	40%
		Total	100%

More Details for Assessment and Deadlines

Quizzes: There will be six quizzes in this course which will be held online and must be completed individually. They will generally consist of problems similar to homework problems or examples worked out in class in multiple choice format. Each quiz will be posted every two weeks (starting second week) on Friday at 12:00 PM on Quercus and will be available until the next day, Saturday, at 1:00 PM. The lowest quiz mark will be dropped and the remaining quizzes will make up 20% of the final grade.

Term Tests: There will be two term tests in this course which will be held **in-person** on Saturday October 5, and Saturday November 9, 2024, from 10:00 AM-12:00 PM. Other details such as the content and location will be announced approximately a week before each term test.

Final Exam: The final exam will be in-person, last 3 hours, and from the entire material. The exact date and location will be determined and scheduled by the Office of the Registrar.

Use of Generative AI: Students may use artificial intelligence tools, including generative AI, in this course as learning aids. However, students are ultimately accountable for the work they submit.

Penalties for Lateness

Late submissions will **NOT** be accepted.

Procedures and Rules

Missed Term Work

Missed quizzes will earn a mark of zero; **without exception**. Reasons/justification for missing the quizzes will not be accepted.

For a missed term test, students must provide valid documentation; that is UTM Verification of Illness or Injury. The documentation must be completed and sent to the course coordinator (omid.jazi@utoronto.ca) within seven days of the missed term test.

Once per semester, each student is allowed to miss work without any documentation. In that case you must fill out the ACORN absence declaration form. The form can be used at most ONCE per semester (once in total for all of your courses, not once per course). The absence you declare can be for a maximum of 7 consecutive days. If you use the ACORN absence declaration form, you do not need to submit any documentation for missed work during that absence.

There is NO make-up test in this course. For a missed term test with valid documentation or absence declaration, the weight will be shifted to the final exam's.

Note: You should check all your course outlines carefully because different courses may have different policies.

Missed Final Exam

Students who cannot complete their final examination due to illness or other serious causes must file an online petition **within 72 hours of the missed examination**. Late petitions will **NOT** be considered. Upon approval of a deferred exam request, a non-refundable fee is required for each examination approved. See the Office of the Registrar Administrative Fees for Services page for more information.

Academic Integrity

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto Mississauga is a strong signal of each student's individual academic achievement. As a result, UTM treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters outlines

behaviours that constitute academic dishonesty and the process for addressing academic offences. Potential offences include, but are not limited to:

In papers and assignments:

1. Using someone else's ideas or words without appropriate acknowledgement.
2. Submitting your own work in more than one course, or more than once in the same course, without the permission of the instructor.
3. Making up sources or facts.
4. Obtaining or providing unauthorized assistance on any assignment.

On tests and exams:

1. Using or possessing unauthorized aids.
2. Looking at someone else's answers during an exam or test.
3. Misrepresenting your identity.

In academic work:

1. Falsifying institutional documents or grades.
2. Falsifying or altering any documentation required, including (but not limited to) doctor's notes.

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.

Informed Consent – Email Lists

As a student enrolled in this course, you understand that you are providing your implicit consent to be included in an email list for the department to send you non-essential information from time to time. If you do not wish to be included in such an email list, please request to be removed by contacting one of the Academic Advisors & Undergraduate Program Administrators. Their information can be found on the MCS Website Contact Us page .

Final Exam Information

Duration: 3 hours

Additional Information

Piazza: Piazza will be used for discussions. This is for student-led discussion. The instructors and the TAs will check Piazza posts on a regular basis and might participate in discussions. Please do not email questions about course content to the instructors or the TAs. Instead, post your question on Piazza. Volume of messages increases one or two days before the test. It will not be possible for the instructors and/or the TAs to answer the questions.

Practice Problems: A list of practice problems will be posted on Quercus. They will form the basis for the term tests and the final exam, and will be essential to your understanding of the topics covered in class. You are encouraged to work together in groups on practice problems to solidify your knowledge of the material. You are also encouraged to ask your questions during the instructors/TAs' office hours and Piazza.

Email Policy: Email is most appropriate for personal questions. Before you send an e-mail, make sure that you are not asking for information that is already on the course outline/ website/announcements, or questions about the course material that are more appropriately discussed during office hours. If you do not get a response, this may be why. If your question is conceptual and does not require calculations or an elaborate answer, you can ask by email. Any questions regarding the tutorials should be addressed to the TAs. For all other matters, contact the instructors. Please email the instructors and the TAs using your U of T email address. The subject line should contain the course number, lecture section number, and a relevant subject (indicating what the email is about). Be sure to include your full name and student number in the body of the message. You will not get a response if you email from other email addresses or do not follow the email policy.

Privacy and Use of Course Materials Notifications: Course 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 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.

Accessibility Needs: The University of Toronto Mississauga 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 Resource Center http://www.utm.utoronto.ca/accessability as soon as possible.

Students Responsibilities:

- It is up to students to know all course policies and important dates. It is also up to them to know about any important announcements; Check the Quercus page regularly!
- Students are responsible for their own learning. The instructors are happy to help them learn, but in the end it is up to them! Use office hours and Piazza often. Make an appointment with the instructors. Keep asking questions until you are satisfied. Ask about big concepts or small details there is no such thing as a stupid question. Always take advantage of extra help.
- Students must follow the U of T code of Behaviour this means that cheaters will be prosecuted. The Academic Regulations of the University are outlined in the Code of Behaviour on Academic Matters. You are expected to be familiar with, and to abide by, all components of the Code of Behaviour on Academic Matters. Full details can be found online at http://www.governingcouncil.utoronto.ca/policies.

Instructors/TAs Responsibilities:

- Lectures will be clearly presented, organized, and have plenty of examples.
- Tutorials, office hours, and Piazza can help you solve problems and solidify your learning.
- Extra help, remedial and acceleration, is always available, during office hours, by appointment, and on Piazza.
- Students emails will be answered in a timely fashion, typically within 48 weekday (business) hours.
- Every student in the class will be treated with fairness and respect. Students who wish to excel are encouraged to consult regularly with the instructor. Students who abuse the U of T code of behavior will be dealt with appropriately.

Course Topics: This course plans to cover the following topics from the textbook.

Chapter 1: Probability and Distributions

1.1 - Introduction

1.2 - Sets

1.3 - The Probability Set Function

1.4 - Conditional Probability and Independence

1.5 - Random Variables

1.6 - Discrete Random Variables

1.7 - Continuous Random Variables

1.8 - Expectation of a Random Variable

1.9 - Some Special Expectations

1.10 - Important Inequalities

Chapter 2: Multivariate Distributions

2.1 - Distribution of Two Random Variables

2.2 - Transformations: Bivariate Random Variables

2.3 - Conditional Distributions and Expectations

2.4 - Independent Random Variables

2.5 - The Correlation Coefficient

2.8 - Linear Combinations of Random Variables

- Theorem 2.6.1 (Moment Generating Function of a Linear Combination of Mutually Independent Random Variables)

Chapter 3: Some Special Distributions

3.1 - The Binomial and Related Distributions

3.2 - The Poisson Distribution

3.3 - The Gamma, Chi-squared, and Beta Distributions

3.4 - The Normal Distribution

Chapter 5: Consistency and Limiting Distributions

5.1 - Convergence in Probability

5.2 - Convergence in Distribution

5.3 - Central Limit Theorem

Schedule: This schedule is tentative and subject to change. Updates will be posted on Quercus.

Weeks	Topics (textbook sections)	Assessments
Week 1 (Sep. 03 - Sep. 06)	1.1, 1.2	-
Week 2 (Sep. 09 - Sep. 13)	1.3, 1.4	Quiz 1
Week 3 (Sep. 16 - Sep. 20)	1.5, 1.6	-
Week 4 (Sep. 23 - Sep. 27)	1.7, 1.8	Quiz 2
Week 5 (Sep. 30 - Oct. 04)	1.9, 1.10	**Term Test I**
Week 6 (Oct. 07 - Oct. 11)	2.1, 2.2	Quiz 3
Week 7 (Oct. 14 - Oct. 18)	2.3, 2.4	-
Week 8 (Oct. 21 - Oct. 25)	2.5, 2.8, Theorem 2.6.1	Quiz 4
Reading Week (Oct. 28 - Nov. 01)	-	-
Week 9 (Nov. 04 - Nov. 08)	3.1	**Term Test II**
Week 10 (Nov. 11 - Nov. 15)	3.2, 3.3	Quiz 5
Week 11 (Nov. 18 - Nov. 22)	3.4, 5.1	-
Week 12 (Nov. 25 - Nov. 29)	5.2, 5.3	Quiz 6
Week 13 (Dec. 02 - Dec. 03)	Review	-

Last Date to drop course from Academic Record and GPA is November 6, 2024.

Equity, Diversity and Inclusion

The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.