STA 247 - Probability with Computer Applications L5101
Tues 7-10, Thurs 7-10 SS 2118

Instructor: Karen H. Wong - karen.huynhwong@utoronto.ca

Office Hours: Tuesdays 2-4 PM, Thursdays 4-6 PM or by appointment in SS6008

Textbook: Scheaffer & Young: *Introduction to Probability and Its Applications*, 3rd ed., 2010
Course Website: All lecture slides, problem sets, course information will be posted on Blackboard.

Course Description: Introduction to the theory of probability, with emphasis on applications in computer science. The topics covered include random variables, discrete and continuous probability distributions, expectation and variance, independence, conditional probability, normal, exponential, binomial, and Poisson distributions, the central limit theorem, sampling distributions, estimation and testing, applications to the analysis of algorithms, and simulating systems such as queues (Note: STA247H1 does not count as a distribution requirement course).

Prerequisites: MAT135H1, MAT136H1/MAT137H1/MAT157Y1; CSC108H1/CSC148H1
Exclusions: ECO227Y1/STA257H1

Grading: There will be multiple evaluations in form of assignments and midterms. The grade breakdown is

In-Class Problem Set	2.5% Each	Almost Each Class (only top 8 counted)
Individual Assignments	15% each	May 28, June 18
Midterms	20%	June 6 (during class, 7-9 PM)
Final Exam	30%	TBD

Assignments: Due to available TA resources, only select problems on the assignments will be evaluated. **For this term, assignments will be submitted through Crowdmark on Blackboard.** Official due dates will be posted on the assignment PDF. Late assignments will be penalized. A penalty of 10% for every hour interval that the assignment is late. For example, if the assignment was submitted 10 minutes after the due date, there would be a penalty of 10%.

Grading Policy: Any answers on assignments, midterms, and final exam without justification and showing your work **will not receive any credit**, regardless of the "correctness" of the answer. It is the responsibility of the student to demonstrate and show that they have learned the course concepts sufficiently. This includes **defining variables/random variables, distributions, relevant parameters, interpreting calculations, etc.** as necessary.

All assignments, midterms, and final exam will be graded according to a strict marking scheme. If after reviewing posted marking schemes you believe you have earned more credit than what was

awarded, please send me an email with a brief explanation **no later than 1 week after the solutions have been released. If you require an extension for an assignment with valid reasons and documentation, please notify the instructor prior to the due date** to have something arranged.

Homework: Suggested practice problems from the textbook and exercises will be provided in the lecture slides for each chapter section covered. I strongly recommend that you attempt as many as possible with and without notes to assess your own understanding of concepts.

In Class Problems: During each class, you will be given a short problem set of 1-2 problems to work on **with a partner** to help you solidify and apply the concepts learned in class. This will be an opportunity to learn how to write a clear solution that demonstrates that you understand the ideas presented. You will also be able to see how your work is graded and make appropriate improvements for your assignment and tests.

Extra Help: I will be holding regular office hours, with extra hours before the midterm and final exam. If you are experiencing difficulty with course content, or have questions related to course material, please come by during the available office hours.

This term we will be using Piazza for class discussion. The system is highly tailored to getting you help fast and efficiently from classmates, the TAs, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. If you have any problems or feedback for the developers, email team@piazza.com. Find our class page here. Use of Piazza is **entirely optional** and students who choose to use it should read the Privacy Policy agreement and post only what they are comfortable sharing as stated in the agreement.

Course Conduct:

- **Email**: Any administrative questions regarding the course can be addressed by me via email. Questions regarding course material and concepts should be addressed in office hours and **NOT** via email. If those times do not work for you, please arrange an appointment to see me.

- **During Lecture**: Please practice classroom etiquette – arrive on time, put your devices on silent, hold your conversations for later, and most of all, be respectful of your peers. If you anticipate that you will have to leave early for any reason, please seat yourself so that you may do so without disrupting your fellow peers.

- **Programming Languages**: In this course, we will occasionally be using R statistical software which is available for free download. Any code required for assignments will be provided either in lecture or easily found using a search engine. **You will not be tested on coding** however you will be expected to read and understand R output during midterms and/or the final exam.

- **Missed Tests**: There are no make-up tests. Any missed tests that are a result of illness requires a **U of T Student Medical Certificate** to be completed by you and your doctor within one week of the test. This can be obtained from your college registrar, the Office of

the Faculty Registrar (SS1006), the Statistics Department office, or the Koffler health service. The weight of the missed term test will be shifted to the final exam. A missed test without proper documentation will receive a mark of zero.

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 me and/or Accessibility Services at 416-978-8060 or through accessibility.utoronto.ca.

Important Dates:

Academic Integrity: Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that the U of T 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. It is the rule book for academic behaviour at the U of T, and you are expected to know the rules. Potential offences include, but are not limited to:

Assignments:

- Using someone else's ideas or words without appropriate acknowledgement.

- Copying material word-for-word from a source (including lecture and study group notes)

- Submitting your own work in more than one course without the permission of the instructor.

- Obtaining or providing unauthorized assistance on any assignment including

  - working in groups on individual assignments

  - having someone rewrite or add material to your work while editing.

  - searching up hints or answers to assignments

- Lending your work to a classmate who submits it as his/her own with or without your permission

On tests and exams:

- Using or possessing any unauthorized aids, including a cell phone, smart watch, programmable calculators.

- Looking at someone else's answers or allowing someone to look at yours

- Misrepresenting your identity.

- Falsifying or altering any documentation required by the University, including doctor's notes

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. Note that because of crowding in the classroom, multiple versions of the quizzes and midterm exam may be administered. The differences between versions will be slight and should not affect the difficulty of particular problems.

Tentative Schedule:

Class	Topics
1: May 16	Probability: Axioms, Events ($\cup, \cap, ^c$), Counting Methods
2: May 18	Counting, Conditional Probability, Law of Total Probability
3: May 23	Discrete Random Variables, Common Discrete Distributions: Bernoulli, Indicator Random Variables
4: May 25	Common Discrete Distributions: Binomial, Geometric, Negative Binomial, Hypergeometric, Poisson
5: May 30	Continuous Random Variables, Common Distributions: Uniform
6: June 1	Common Continuous Distributions: Exponential, Gamma, Normal, Normal Approximation to Binomial
7: June 6	MIDTERM
8: June 8	Moment Generating Functions
9: June 13	Discrete, Continuous Multivariate and Joint Distributions
10: June 15	Continuous Multivariate and Joint Distributions, Intro to Transformations *I won't be here – This class' material will be posted as a series of short videos*
11: June 20	Transformations
12: June 22	Central Limit Theorem