STA 247 - Probability with Computer Applications L0101
M 3-5, F 3-4 (OI G162) & Tutorials F 4-5

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

Office Hours: HS (155 College St.) - ROOM & TIME TBD

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 Quercus.

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/STA255H1/STA257H1

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

Syllabus Hunt	1.5%	Sept. 22
Individual Assignments (2)	10% each	Oct. 11, Dec. 2
Tutorial Activities (9)	1.5% each	Weekly
Midterm	25%	Oct. 18 3:10-5 PM, Location TBD
Final Exam	40%	TBD

Assignments: Due to available TA resources, only select problems on the assignments will be evaluated. **Assignments will be submitted through Crowdmark on Quercus.** Official due dates will be posted on the assignment PDF. Late assignments will receive a penalty of 5% for every hour interval that the assignment is late. For example, if an assignment is submitted 10 minutes after the due date, there would be a penalty of 5% on the assignment grade (i.e. 90% $\rightarrow$ 85%).

Tutorials: Tutorials begin on **September 13** and will consist of short learning and problem solving activities that will be graded. The activities aim to help you develop and apply concepts in novel problems, work with your peers, learn to present solutions, and gain feedback on your work. You will only be permitted to use course notes and a calculator.

Midterm & Exams: Midterm information, probability tables, and aid sheets will usually be available on Quercus 1 week (2 weeks for final exam) prior to the date of the test. You are permitted to bring **non-programmable calculators** to the test. (What is a Non-Programmable Calculator?). You are not permitted to bring your own tables/aid sheets to the test/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 here.

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 student's responsibility to show with utmost clarity 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 comprehensive marking scheme. If after reviewing your work against the solutions you believe you have earned more credit than what was recorded, 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 me 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. It is strongly recommend that you attempt as many as possible with and without notes to assess your own understanding of concepts.

Extra Help: There will be 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. TA office hours will be located in HS 381.

This term we will be using Piazza for class discussion. The system is highly tailored to getting you help quickly 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. Piazza supports LaTeX and upload of images, making it very easy for you to post your questions. 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.

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 email accessibility.services@utoronto.ca. You can find out more information here.

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/Piazza.
- **During Lecture:** Please practice classroom etiquette – arrive on time, place devices on silent, put a pause on your conversations, 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 can leave without disrupting others.
- **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.

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 Matters. You are expected to know the rules of conduct outlined within. 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)
- Obtaining or providing unauthorized assistance on any assignment including
  - working in groups on individual assignments – this includes giving hints to help them get to the answer!
  - having someone rewrite, edit, or add material to your work while editing.
  - researching for inspiration, hints, or answers to any graded problem
- 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.

Tentative Schedule:

Week	Topics
1: Sept. 6	Introduction to the Course, Recurring definitions,
2: Sept. 9-13	Probability: Axioms, Events ($\cup, \cap, ^c$), Independence vs. Mutually Exclusive, Intro Counting
3: Sept. 16-20	Counting, Conditional Probability
4: Sept. 23-27	Law of Total Probability, Discrete Random Variables
5: Sept. 30 - Oct. 4	Common Discrete Dist^n: Bernoulli/Indicator Variables, Binomial
6: Oct. 7-11	Poisson, Continuous Random Variables
7: Oct. 14-18	THANKSGIVING & MIDTERM
8: Oct. 21-25	Common Continuous RV: Uniform, Exponential, Gamma Normal Distribution
9: Oct. 28-Nov. 1	Normal Distribution and Properties, Moment Generating Functions
10: Nov. 4-8	FALL BREAK
11: Nov. 11-15	Transformations of Random Variables
12: Nov. 18-22	Bivariate Distributions: Discrete and Continuous
13: Nov. 25-29	Bivariate Distributions: Continuous (NO TUTORIAL - 2 Hour Lecture on 29^{th})
14: Dec. 2-5	Central Limit Theorem and Applications (Make-Up Monday Dec. 5)