UNIVERSITY OF TORONTO
DEPARTMENT OF STATISTICS

STA247H1S- Probability with Computer Applications
Course Outline- Winter 2015

Instructor: Luai Al Labadi
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Office Hours: Thursday 11:00 am - 1:00 pm
If you need to see me at any other time, please email me for an appointment.

TA:

- Office hours:

Day	Time	Location	Name
Friday	10:00-11:00 am	Statistics Aid Centre (Sidney Smith 1091)	Boris Garbuzov
Thursday	1:00-2:00 pm	Statistics Aid Centre (Sidney Smith 1091)	Wei Deng

- The following TAs can be contacted by email:

Boris Garbuzov	boris.garbuzov@gmail.com
Jialin Zou	jialin@utstat.utoronto.ca
Pratik Patil	pratik.patil@mail.utoronto.ca

Lectures: Monday 3:00 pm - 5:00 pm and Friday 3:00 pm - 4:00 pm in **SS** 2117.

Official 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).

Prerequisite: MAT135Y1/MAT137Y1/MAT157Y1; CSC108H1/CSC148H1
Exclusion: ECO227Y1/STA257H1
Distribution Requirement Status: This is a "None" course
Breadth Requirement: The Physical and Mathematical Universes (5)

Course Objectives: The successful student will learn the basics of probability. These concepts will be applied to a wide variety of settings, including the business and economics environments.

Main Text: Grinstead & Snell: *Introduction to Probability*, 2nd revised ed., AMS, 1997. `http://www.dartmouth.edu/~chance/teaching_aids/books_articles/probability_book/book.html`

Supplementary Books:

- Scheaffer & Young: *Introduction to Probability and Its Applications*, 3nd ed., AMS, 2010.

- Higgins & Keller: *Concepts in Probability and Stochastic Modeling*, 1994.
- Ross: *Introduction to Probability Models*, 10th ed., Academic Press, 2010.
- Kerns: *Introduction to Probability and Statistics Using R*, 2011. `http://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf`

Calculation of the final grade:

Assignments	6%, 6%, 6%	Jan. 19, Feb. 9, March 9
Quizzes	6%, 6%	Jan. 26, March 16
Midterm Exam	30%	t.b.a.
Final Exam	40%	t.b.a. by faculty

Clean Drop: March 8, 2015- last day to drop this course from academic record and GPA.

Requirements and Criteria:

- Three assignments will be collected. You may consult with your fellow students, but each student must submit individual answers and document his/her thought processes. Assignments (hard copies only!) must be submitted in class on or before the due date, and I am not able to accept late assignments or electronic submissions.
- The midterm test will take place in mid-February, on a date to be determined soon. It will probably NOT be administered during class hours. It may include any material covered up to the end of the previous class, unless stated otherwise in class.
- The final exam will emphasize material since the midterm, but may still include questions from earlier material in the course.
- For the various tests, students will be permitted to use a non-programmable, non-plotting calculator. If there is any doubt about the permissibility of your particular calculator, please consult in advance.
- Students must bring their U of T student ID to all quizzes, tests, and exams.
- Full details must be given in your solutions and your work must be clearly legible. In order to receive any marks for the question, you must fully justify your final answer.

Conduct of Classes:

- Ordinary classroom etiquette is expected of all of the students. This includes arriving on time, turning off cell phones and similar devices, and respect for fellow students.
- Leaving the classroom while a lecture is in progress is disruptive and should be avoided. If you feel that you will need to leave class before it ends, please sit close to the rear doors and alert the instructor to your situation.
- The class time will be used for lectures and discussion, based mostly on the material in the textbook. However, the instructor may assign additional reading and/or exercises to supplement the book.

- Class participation is strongly encouraged: asking questions, comments that relate this course to others that you are taking, pointing out mistakes on the chalkboard, etc.

- Blackboard will be used throughout the course. Please log into Blackboard using your UTOR ID and keep updated regarding class information and material. If an urgent matter arises, I may contact the entire class by e-mail. In order to receive these messages, please make sure that your ROSI account has your utoronto.ca email.

The Statistics Aid Centre can be an important source of help with difficulties. There are, in fact, two locations: Sidney Smith 1091, and New College Wetmore 68A. Your designated TA will be on duty at least one hour per week, but you may drop in at any time if you are willing to wait for other students to be served. Schedules will be posted as soon as they become available. Some additional information may be available at `http://www.utstat.utoronto.ca` - click on Statistics Aid Centres for the schedule.

Procedures and Rules:

- **Email:** The instructor and the TAs may be contacted by email at any time. In general, the TAs should be contacted regarding subject matter, and the instructor regarding administrative matters. **Note that if message traffic becomes excessive, the course email policy may be revised at any time during the term.**

- **Missed Midterm Test:** There are no make-up tests. Should you miss the term test due to illness, you must submit to your instructor, within one week, completed by yourself and your doctor, the '**U of T Student Medical Certificate**', obtainable from your college registrar, the Office of the Faculty Registrar (SS1006), the Stats Dept. office, or the Koffler health service. The test's weight will then be shifted to the final exam. If proper documentation is not received, your test mark will be zero.

- **Missed Quiz:** If a student misses a quiz for legitimate reasons, please discuss this matter with your instructor. Should you miss the term test due to illness, you must submit to the instructor, within one week, completed by yourself and your doctor, the '**U of T Student Medical Certificate**'. If proper documentation is not received, your quiz mark will be zero.

- **Programming languages:** The official primary programming language for this course is **R**. **R** is available on numerous campus computers, and it is free to install on a student's personal computer. Students should use R for assignments. **R will not appear on exams or quizzes.**

- **Quizzes:** The printed quizzes may contain a superset of questions, from which your specific questions will be determined on the basis of your student number.

- **How to present your work:** On assignments and tests, make sure that your final answers are not difficult to find. When asked to supply one answer, do not give two. Show your work (i.e., document your thought processes). Some wrong answers may be awarded partial credit, but not unless you show your work. Careless rounding and similar sloppiness will result in deductions. Cover pages are not required for the assignments.

- **Marking issues:** The TAs and the instructor are well aware of the importance of grades to most students, and great care will be taken in the marking of assignments, quizzes, and exams. In the unlikely event that you feel a question has been mis-marked, or the marks

have been added up incorrectly, you can submit your test back to the instructor with a note explaining what you believe requires further examination. This must be done within one week of the test being returned to the class.

- **Cancellation policy:** In the event of inclement weather, instructor illness, or similar circumstances resulting in class cancellation, any quiz or assignment due date will be postponed until the next class. Minor adjustments to the overall course schedule might be necessary, and these will be posted.

  Formal rules are in place regarding the rescheduling of final exams, and these will be followed if necessary.

- **Accessibility:** Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability or health consideration that may require accommodations, please feel free to approach me and/or the Accessibility Services Office as soon as possible. The Accessibility Services staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations. The sooner you let them and me know your needs, the quicker we can assist you in achieving your learning goals in this course.

  For more information, please refer to `http://www.accessibility.utoronto.ca/`.

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 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 Torontos Code of Behaviour on Academic Matters (`http://www.governingcouncil.utoronto.ca/policies/behaveac.htm`). 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:

In papers and assignments:

- Using someone elses ideas or words without appropriate acknowledgement.
- Copying material word-for-word from a source (including lecture and study group notes) and not placing the words within quotation marks.
- Submitting your own work in more than one course without the permission of the instructor.
- Making up sources or facts.
- Including references to sources that you did not use.
- Obtaining or providing unauthorized assistance on any assignment including
  - working in groups on assignments that are supposed to be individual work,
  - having someone rewrite or add material to your work while editing.
- Lending your work to a classmate who submits it as his/her own without your permission.

On tests and exams:

- Using or possessing any unauthorized aid, including a cell phone.

- Looking at someone elses answers.
- Letting someone else look at your answers.
- Misrepresenting your identity.
- Submitting an altered test for re-grading.

Misrepresentation:

- Falsifying or altering any documentation required by the University, including doctors notes.
- Falsifying institutional documents or grades.

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 have questions about appropriate research and citation methods, seek out additional information from the instructor, or from other available campus resources like the U of T Writing Website (`http://www.writing.utoronto.ca/`). 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 mid-term exam may be administered. The differences between versions will be slight and should not affect the difficulty of particular problems.

Tentative Topic Outline- The following topics will be covered, and in approximately this order:

Week	Topic	Chapter (G & S)
1	Discrete Probability Distributions	1
2	Combinatorics; Discrete Conditional Probability	3; 4
3	Expected Value and Variance for Discrete Random Variables	6
4	Important Discrete Distributions	5
5	Continuous Probability Distributions	2; 4
6	Important Continuous Distributions	5
7	Generating Functions; Sum of Random Variables	10; 7
8	Discrete Joint Probability Distributions	5 & 6 of S & Y
9	Continuous Joint Probability Distributions	5 & 6 of S & Y
10	Central Limit Theorem	9
11	Markov Chains	11
12	Markov Chains- continued	11