STAT 2605A – Probability Models, Fall 2022

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Text: Sheldon Ross, *A First Course in Probability*,
Prentice Hall/Pearson, 9th Edition

Lecture: Tuesday and Thursday, 1:05 pm – 2:25 pm
Building: Richcraft Hall, Room 3201

Tutorial: Tuesday 5:35 pm – 6:25 pm starting on **Sept 20**
Section A1 Building: University Centre, Room: 378

Office Hours: Tuesday 3 pm – 4 pm (online)
or email me for appointments

Prerequisites: MATH 1007 (or MATH 1004 or MATH 1002 or MATH 1052), and
MATH 1104 (or MATH 1107 or MATH 1102 or MATH 1152).
Precludes additional credit for STAT 3502 and STAT 2655

Quizzes: During tutorials on Sept 20, Oct 18, Nov 22

Tests: During tutorials on Oct 4, Nov 8, Nov 29

Note: There will be 3 quizzes (25 minutes each) to be written at the end of tutorials of the chosen dates, and 3 50-minute term tests during tutorials. The best 2 of the 3 quizzes (resp., tests) will be counted if you write all of them and obtain at least 20% each. No make-up, early, or delayed tests (or quizzes) will be held. Absence is excused only for medical reasons (a doctor's note may be presented). Any missing test/quiz will be counted as zero. Due to the pandemic situation, we understand it may be difficult to obtain a doctor's note. If you miss a midterm test due to illness, you may elect to submit within 3 business days the self-declaration form https://carleton.ca/registrar/wp-content/uploads/COVID-19_Self-declaration.pdf.

The final grading takes into account the student's adequate workload and participation. If you unfortunately have to miss too much of your term work due to frequent illness, it is advisable you take this course in the future.

Important Dates:		
	First lecture	September 8
	Last day to change courses	September 20
	Last day to withdraw	September 30
	Fall break	October 24-28
	Last lecture	December 8
	Exam period	December 10 – 22

Grading Scheme:		
	Quizzes	18%
	Tests	32%
	Final Exam	50%

Email communication with instructor: Please use your Carleton account ONLY for all course related email, and write on the **subject line** your course code STAT2605, which I will use to manage email.

Announcements: You are responsible for keeping up with information announced on Brightspace, or sent to your e-mail account.

Assignments: They will be given regularly. Practice problems are included. You are advised to solve as many problems as possible before the tutorials.

Final examination (50%): This is a three (3) hour exam scheduled by the University during the final exam period from Dec 10–22, 2022. It is the responsibility of each student to be available at the time of the examination. In particular, no travel plans for the examination period should be made until the examination schedule is published.

Conditions to pass the course: You cannot pass the course if you only achieve less than 30% of your overall term work (including quizzes and term tests). Although the absence from some tests for medical reasons may be excused, this course requires the student's adequate workload and participation. If a student has missed too many parts of all quizzes and tests, the student cannot pass this course due to inadequate workload and participation, regardless of the performance in the final examination.

Calculators: You may use only simple non-programmable, non-graphing calculators for the tests and the final examination in this course.

Intellectual property notice: All materials created for this course (including lecture notes, posted/recorded videos, assignments and tests and posted solutions, the final exam, etc) remain the intellectual property of the instructor. These materials are intended for the personal and non-transferable use of students registered in the current offering of the course. Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials publicly for commercial or non-commercial purposes without written consent from the instructor. A student who publicly posts or sells an instructor's work, without the instructor's expressed consent, may be charged with misconduct under Carleton's Academic Integrity Policy and/or Code of Conduct.

Academic Accommodation: You may need special arrangements to meet your academic obligations during the term because of disability, pregnancy or religious obligations. Please review the course outline promptly and write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. Please make sure you respect these timelines particularly for in-class tests, mid-terms and final exams.

You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at http://carleton.ca/equity/accommodation.

Students with disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. The deadline for submitting completed forms to the Paul Menton Centre for **December** Examinations is **Nov. 11, 2022**.

Academic Integrity: Any student violating the University's standards of academic integrity, including but not limited to misconduct in their coursework, tests, and final examination, will be subject to appropriate sanctions. For more details, visit the Registrar's Office website
https://carleton.ca/registrar/academic-integrity/.

Lecture Outline

Week 1: Sept. 8-13 – Sample space, events. Set notation. Assigning probability. Axioms of probability. Sec. 2.1-2.3, 2.7.

Week 2: Sept. 15-20 – Properties of probability. Counting rules. Conditional probability. Sec. 2.3-2.5, 1.1-1.4, 3.1, 3.2.

Week 3: Sept. 22-27 – Bayes' rule. Independence. Discrete random variables (r.v.) Sec. 3.3, 3.4, 4.1, 4.2.

Week 4: Sept. 29- Oct. 4 – Functions of r.v. Expected value. Variance. Bernoulli and binomial r.v. Sec. 4.3-4.6.

Week 5: Oct. 6-11 – Poisson and other discrete distributions. Expectation of sums of r.v. Sec. 4.7-4.9.

Week 6: Oct. 13-18 – Continuous r.v., $E(X)$, $Var(X)$, $Eg(X)$. Uniform r.v. and other examples. Sec. 5.1-5.3.

Week 7: Oct. 20- Nov. 1 – Normal r.v. Exponential r.v. Distribution of a function of r.v. Simulations. Sec. 5.4, 5.5, 5.7, 10.2.1. (Fall break Oct. 24-28)

Week 8: Nov. 3-8 – Joint distribution of two r.v. Independence. Sums of independent r.v. (lecture notes only)

Week 9: Nov. 10-15 – Chebyshev's inequality. Weak law of large numbers. Central limit theorem. Sec. 8.1-8.3.

Week 10: Nov. 17-22 – Poisson process. 4.7, 5.6.1, 9.1.

Week 11: Nov. 24- Nov. 29 – Markov chains. Sec. 9.2.

Week 12: Dec. 1-6 - Makov chains (continued), Review.

Week 13: Dec. 8 — Review (ctn)

Note: The above is a tentative schedule and may be subject to change depending on the progress of the course.