University of Manitoba
Department of Statistics

STAT 2400 – Introduction to Probability I

Fall Term 2019

Course Details

Course Number & Title:	STAT 2400, Introduction to Probability I
Section & CRN:	Section A01, CRN: 11189
Course Schedule:	Monday/Wednesday/Friday, 9:30 to 10:30 a.m. (Slot 2), in 201 Armes.
Lab Schedule:	Wednesday, 2:30 to 4:00 p.m, in 201 Armes.
Prerequisites:	one of STAT 1150 (C) or STAT 2000 (B); one of MATH 1232 (C) or MATH 1700 (B).

Instructor Contact Information

Instructor:	Alexandre Leblanc
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Email:	Alex.Leblanc@umanitoba.ca
Office Hours:	Tuesday, from 9:30 to 11:00, Friday, from 10:30 to 12:00, or by appointment.

General Goals for this Course

This course is meant to start your basic training in probability theory by providing a semi-formal introduction to its most important basic concepts. As such, some goals for the course are to help you build and develop

- a solid foundation in basic probability that you can rely on for your upper level courses in Statistics, Actuarial Mathematics and Data Science,

- skills related to the understanding and writing of basic mathematical proofs,

- analytical skills related to problem solving.

In this course, you will have an opportunity to develop a solid intuition and understanding of probabilistic ideas, along with solid skills in calculus and applied mathematics. All these skills will be essential to your success. The course is quite demanding and your success will depend heavily on your hard work and ability to solve many practice problems yourself. For instance, getting the solutions from your friends (rather than doing the problems yourself), learning the course notes by heart and cramming for exams are typically not very successful strategies. Remember that, most of the times, the work you do to get to a solution (including all the mistakes made along the way) is more important than the solution itself: you will learn more from the work and research you do to get to the answer than from copying down a solution found online or in some textbook!

Textbook and Other Materials

Textbook: The course will be based on

- Weiss, N.A. (2006), A course in Probability, Pearson.

A copy of the textbook will be available on reserve at the Science Library.

Lecture notes: Lecture notes and other materials (e.g. practice problems, sample tests and exams, solutions) will be posted on the UM Learn system regularly.

Other references: The following are other useful references that will also be available on reserve at the Science Library.

- Ross, S.M. (2006), A First Course in Probability,
- Ghahramani, S. (2005), Fundamentals of Probability with Stochastic Processes,
- Roussas, G. (2007), Introduction to Probability.

Course Evaluation and Grading Scheme

Final Mark: The final mark for the course will be obtained from the following rule.

Midterm Tests (2)	50%	(30% better test – 20% other)
Final Exam	50%	

Letter Grade: I normally use the following cutoffs when assigning letter grades:

Letter Grade	Mark out of 100	Letter Grade	Mark out of 100
A+	90-100	C+	65-70
A	80-90	C	60-65
B+	75-80	D	50-60
B	70-75	F	below 50

However, I might elect to use lower thresholds for some letter grades if I think they are more appropriate. I will not use higher thresholds.

Supplementary Problems and Labs

Suppl. Problems: There are no assignments to be handed in for credit in this course. However, different lists of supplementary problems will be provided to you. Each test/exam will ask for at least two problems taken from those lists, in original or slightly modified form. In the past, the number of problems taken from the lists has often been closer to four or five on each test/exam.

Labs: There is a ninety-minute lab every week. Attendance is not obligatory, but is very strongly suggested. Note, however, that the two tests will take place during the lab (see below). Also, the first lab will be replaced by a lecture. (See Important Dates on p. 3.)

During labs, the teaching assistant will generally be solving selected problems (taken from the list of supplementary problems) and answering other questions that you might have.

Tests and Exam

Midterm Tests: There will be two 90-minute tests, currently scheduled for Wednesday, October 9 (in 201/205 Armes) and Wednesday, November 6 (in 201/205 Armes) between 2:30 and 4 pm (i.e. during the lab).

Make-up tests will not be scheduled.

Should you miss a test, you will be assigned a mark of zero unless you:

1. provide a valid excuse with acceptable documentation,
2. notify me within 48 hours of the scheduled test (phone or email is fine).

The other test and the final exam would then respectively count for 25% and 75% of your final mark for the course.

Should you miss both tests and

1. provide a valid excuse with acceptable documentation for each test,
2. notify me within 48 hours of missing each test,

the final exam would then count for 100% of your final mark.

Final Exam: The Final Exam will be held on a date and time to be selected later by the Registrar's office and will be 3 hours in duration. The exam will be scheduled during the University-wide examination period taking place on December 9-20.

Grading timeline: Under normal circumstances, test results should be available within two weeks of the test being written.

Important Dates

The following dates are important as to how the course will progress throughout the term.

Date	Information
Sept 4	First lecture
	No Lab – two lectures
Sept 11	No Lab – two lectures (although this could change)
Sept 17-18	End of the registration revision period
Oct 9	Tentative date for Test 1 (in 201/205 Armes)
Oct 14	Thanksgiving Day - no classes
Nov 6	Tentative date for Test 2 (in 201/205 Armes)
Nov 11-15	Fall Term break - no classes or lab
Nov 18	Last day to VW the course
Dec 6	Last lecture
Dec 9-20	Final Examination Period

The dates for the midterm tests are tentative (and subject to change at my discretion and/or based on the learning needs of the students). Changes are subject to Section 2.8 of the ROASS Procedure.

Outline of Covered Topics and Approximate Timeline

Chapter and Title	Approx. Duration (in weeks)
1. Basic Concepts (Weiss, Chap. 1 and 2) – A review of set theory – Sample space, events – Axioms of probability and basic probability rules	2
2. Combinatorial Probability (Weiss, Chap. 3) – Counting: permutations and combinations – Counting rules in probability calculations	1.5
3. Conditional Probability and Independence (Weiss, Chap. 4) – Conditional probability and the general multiplication rule – Independence – Bayes rule	2
4. Discrete Random Variables (Weiss, Chap. 5) – Discrete random variables and probability mass functions – Important counting random variables – Poisson approximation to the binomial – Binomial approximation to the hypergeometric	2.5
5. Jointly Discrete Random Variables (Weiss, Chap. 6) – Marginal and joint probability mass functions – Conditional probability mass functions – Independent random variables – Sums of discrete random variables	2.5
6. Expected Values (Weiss, Chap. 7) – Basic properties of expected values – Mean, variance, covariance and correlation – Conditional expectation	2
7. Additional Optional Topics – Moment generating functions – Cumulative distribution functions – Introduction to continuous random variables – Central limit theorem – Normal approximations to counting random variables	0.5

Technology in the Classroom

It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. Students should restrict their use of technology to those approved by the instructor *for educational purposes only.* Electronic messaging, email, social networking, gaming, etc. should be avoided during class time. Cell phones should be turned off. If a student is on call for emergencies, their cell phone should be in vibrate mode and the student should leave the classroom before using it.

Class Communications

The University requires all students to activate an official U of M email account, which should be used for all communications between yourself and the university (including all your instructors). All these email communications should comply with the University's policy on electronic communication with students, which can be found at: `www.umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html`

Copyrights

Copyrighted Materials: We will use copyrighted content in this course. I have ensured that the content I use is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission.

Lectures: No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without my permission.

More details are available online at: `www.umanitoba.ca/copyright/`.

Academic Integrity

The value of a degree from the University of Manitoba is dependent on students and faculty strictly upholding values of honesty and academic integrity in all their work. Academic dishonesty devalues the hard work and effort of students who are working honestly to achieve their degrees. For these reasons, it is important that you understand the basics of academic integrity, what constitutes academic dishonesty and what are its very serious consequences. Useful resources (esp. with respect to writing tests and exams) can be found at: `www.umanitoba.ca/student/resource/student_advocacy/academicintegrity/students/a-to-i-what-is-academic-integrity.html`

ROASS Schedule A

Schedule "A" of the *Responsibilities of Academic Staff with regards to Students* (ROASS) policies of the University of Manitoba lists resources and policies for students. It is important that you familiarize yourself with these resources and policies. This document is available from the Department of Statistics web page at: `www.sci.umanitoba.ca/statistics/`.

This document is dated September 3, 2019.