

University of Manitoba
Department of Statistics

STAT 2400 – Introduction to Probability I

Winter Term 2022

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),
Lab Schedule: Wednesday, 14:30 to 16:00.
Prerequisites: one of STAT 1150 (C) or STAT 2000 (B);
one of MATH 1232 (C) or MATH 1700 (B).
No special permissions are given with respect to prerequisites.

Instructor Contact Information

Instructor: Alexandre Leblanc
Office Location: 367 Machray Hall
Phone: (204) 474-6273
Email: Alex.Leblanc@umanitoba.ca
Office Hours: Monday, Wednesday and Friday from 10:30 to 11:30 (Q&A sessions),
or by appointment (for individual meetings).
Note: The system for Office Hours will change if we go back to regular
in-person lectures.

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.

This being said, you should be able to get by without making use of the textbook if you carefully study the provided lecture materials and occasionally read from the other references.

Other references: Other useful references that are downloadable in PDF through Springer-Links and the University of Manitoba Libraries are

- Pitman (1993), *Probability*,
- Dekking, Kraaikamp, Lopuhaä & Meester (2005), *A Modern Introduction to Probability and Statistics*,
- Devore & Berk (2012), *Modern Mathematical Statistics with Applications*.

Another very good resource is the following textbook:

- Ross (2010), *A first Course in Probability*, 8th edition,

or, any of the more recent editions. The book is available for online viewing through the University of Manitoba Libraries and the Hathi Trust. Instructions on how to use the Hathi Trust online viewing system can be found at <https://libguides.lib.umanitoba.ca/c.php?g=717736>

Other Materials: Lecture notes, practice problems, sample tests and exams, solutions, short videos and other materials will be posted on the UM Learn portal regularly.

Practice Questions: There are no assignments to be handed in for credit in this course, but opportunities to practice will be provided to you. First, a list of practice problems will be provided to you. You are free (and encouraged) to work in groups on the practice problems, but remember the work you do to get to a solution is more important than the solution itself: it is all about the process needed to get to a solution, rather than the answer itself. So, getting the solutions from a classmate is not going to help you develop the skills you will be examined on.

You will also be provided with practice tests (with complete solutions). It is expected that you use these practice tests as a practice assessment: work on the questions like you would on an regular in-person test, without looking at the solutions. This will allow you to evaluate your level of readiness for writing your test.

Course Delivery and Technology

Lecture Delivery: This course will initially be delivered remotely and use a combination of synchronous (via Zoom) and asynchronous learning components. You are expected to be online during the scheduled live lecture times, although live lectures will be recorded and available for later viewing. Lectures will be followed by Q&A sessions that will also be recorded.

Note: This will change if we go back to regular in-person lectures. The University continues to monitor the developments of the latest pandemic situation and will provide an update as to whether in-person activities can be safely offered as per public health guidelines after February 26.

You are also expected to monitor the course UMLearn page between class times to constantly keep up with the latest course-related developments. In particular, the appropriate way to access the lectures (Meeting reference number and password) will be posted in the course calendar on UMLearn.

Your computer or device, and internet connection must meet the recommended minimum technology requirements (see below) to ensure you have a good experience in the course. I will be posting short videos on many of the items found in the course notes on UMLearn. It is important that you keep up with these videos to ensure that you do not fall behind. Your ability to keep up with the pace of the course will be crucial here as the course format makes you much more responsible for your learning experience than you would be with regular in-person course delivery. Labs will be used for problem solving and holding the tests.

Labs: There is a ninety-minute lab every week. Attendance is not obligatory, but is very strongly suggested. Note, however, that three tests will take place during the lab. (See Important Dates on p. 5.)

During the lab, you can expect the TA to generally solve selected problems taken from the list of supplementary problems and answer other questions that you might have. Labs will initially be delivered remotely and synchronously, and be recorded and made available for later viewing.

Note: This will change if we go back to regular in-person lectures. Labs would then be delivered in-person as well.

Course Technology: Students enrolled in this course must ensure they satisfy the following minimum technological requirements:

- a computing device where one can create and edit documents,
- an internet connection capable of streaming videos and downloading software, and
- access to a web-cam and microphone.

See also the Student Technology and Connectivity Recommendations available at

centre.cc.umanitoba.ca/wp-content/uploads/2020/04/Student-Connectivity-Recommendations.pdf

Finally, as the live remote components of the course will take place via Zoom, it is recommended that you install Zoom on your device. This, however, won't be necessary to view recordings of the lectures.

Assessments and Grading Scheme

Crowdmark: All assessments in this course will be conducted using the Crowdmark software. For this, you will write your assessment on paper, and then scan and upload your work through a link that will be provided to you by email (a different link will be sent to you for each assessment). It is important that you follow the detailed instructions for this in order to facilitate the process for everyone.

In particular, it is important that you upload a scanned copy of your work. For this, you can use a scanner, if you have access to one, or Apps like CamScanner that are free and can be installed on your phone or tablet. Scanning your work is important because pictures tend to be too large (causing problems during uploading and marking) and are often difficult to read (being too blurry and/or having not enough contrast). Work that is difficult to read or unreadable may be penalized or even receive a mark of zero. Finally, make sure that your solutions are oriented properly.

Note: This will change if we go back to regular in-person lectures. Tests would then be administered in-person as well.

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

Tests (3)	60%	(best 30%, worst 10%, other 20%)
Final Exam	40%	(covering all course content)

Note that the tests and exam are to be completed individually. Any kind of communication/collaboration between students (with someone from the class or not) during an assessment will be considered academic misconduct.

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 slightly lower or higher thresholds for some letter grades if I think they are more appropriate.

Caveat: To receive a passing grade in the course, you need to have received a passing mark in at least two assessments.

Tests and Exam

Tests: There will be three 75-minute tests, currently scheduled for March 2, March 30 and April 13, all during the lab time slot between 14:30 and 16:00.

Make-up tests will not be scheduled. Should you miss a test, you will be assigned a mark of zero unless you notify me by email within 48 hours of the scheduled test. If you miss one test, the final exam will count for 50% of your final mark for the course, and the two other tests will be respectively worth 30 and 20% of your final mark. If you miss two tests, the final exam will count for 70% of your final mark for the course, and the test you have written will be worth 30% of your final mark. Do note the potential impact of the above caveat in these cases.

Final Exam: The Final Exam will be scheduled by the Registrar's office during the University-wide examination period taking place between April 26 and May 3, inclusive. If you miss the final exam, you should contact a student advisor from your home Faculty within 48 hours of the scheduled exam time.

Grading timeline: Under normal circumstances, test results should be available (and marked papers returned) within two weeks of a test being written.

Important Dates

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

Date	Information
Jan 24	First Lecture
Jan 26	Lab is replaced by lecture
Feb 2	First Lab
Feb 4-7	End of the registration revision period
Feb 21-25	Winter Term break - no classes or lab
March 2	Test 1 (Modules 1 and 2)
March 30	Test 2 (Modules 3 and 4)
April 13	Test 3 (Module 5)
April 15	Good Friday - no class
April 25	Last lecture - Last day to VW the course
April 26 - May 3	Final Examination Period

The dates and content for the tests are tentative (and subject to change at my discretion). Changes are subject to Section 2.8 of the ROASS Procedure.

Outline of Covered Topics and Approximate Timeline

Module and Title	Approx. Duration (in weeks)
1. Basic Concepts (Weiss, Chap. 1 and 2) – Axioms of probability and basic probability rules	2
2. Combinatorial Probability (Weiss, Chap. 3) – Counting rules and probability calculations	1.5
3. Conditional Probability and Independence (Weiss, Chap. 4) – Conditional probability, Independence & the Bayes rule	2
4. Discrete Random Variables (Weiss, Chap. 5) – Discrete random variables and probability mass functions	2.5
5. Continuous Random Variables (Weiss, Chap. 8) – Continuous random variables, cdf, pdf	2.5
6. Expected Values (Weiss, Chap. 7, 10, 11) – Basic properties of expected values, mean and variance – Moment generating functions	2
7. Additional Optional Topics – Joint Distributions - many independent random variables – Central limit theorem	Time permitting

Respectful Behaviour in the Online Classroom

For all live components of this course, it is expected that you conduct yourself professionally and do not distract your fellow students with unnecessary or inappropriate chat messages, sounds, or images if you are ever on camera. If you appear on camera, it is expected that you will be dressed appropriately for a classroom environment and that your background does not contain distracting or offensive materials. As a simple rule, if you would not do something in an in-person class setting, do not do it in the virtual setting.

Do note that live components of the course are expected to be recorded and available for viewing later. You should mute yourself unless you are asking a question and turn off your video if you prefer not to appear on the recording of the lecture.

Class Communications

The University requires all students to activate an official U of M email account. You should be using this for all communications between you and me (and, in fact anything related to 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

When emailing me, please make sure to follow proper email etiquette: emails should start with an opening salutation, be written in complete English (or French) sentences and be signed with your name and student number. I will generally reply to emails within 24 hours, depending on the urgency of the situation and my availability, except during weekends. Note that I will not divulge grades over email.

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.

In particular, note that you do not have permission to upload any course notes, tests, practice problems and tests, or any other handout I will use for this course to any note sharing websites.

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. Videos and recorded lectures will be made available to you in UMLearn for your own personal use only.

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 can be found at www.umanitoba.ca/student/resource/student_advocacy/academicintegrity/students/a-to-i-what-is-academic-integrity.html

and

www.sci.umanitoba.ca/students/undergraduate-students/academic-resources/academic-integrity-2/

While this is a remote learning course, I expect students to hold themselves to the highest standards of academic integrity. Impersonation, plagiarism, and using unauthorized materials or for hire websites are all very serious offences and are no less serious in an online environment. I expect you to be honest and conduct yourself with integrity. When in doubt, do not hesitate to contact me to discuss what is and what is not allowed. Asking is a sign of integrity, not a signal that you are planning to cheat. I expect you to follow the rules: ignorance is not an acceptable excuse for academic misconduct.

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/courses-and-programs/outlines.