

University of Manitoba  
Department of Statistics

**STAT 2400 – Introduction to Probability I**

Fall Term 2020

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**Course Details**

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**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.

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**Instructor Contact Information**

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**Instructor:** Alexandre Leblanc  
**Office Location:** 367 Machray Hall  
**Phone:** (204) 474-6273  
**Email:** Alex.Leblanc@umanitoba.ca  
**Office Hours:** Monday, from 10:30 to 11:30,  
Wednesday, from 9:30 to 10:30,  
Friday, from 9:30 to 10:30,  
or by appointment.

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**General Goals for this Course**

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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!

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## Textbook and Other Materials

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**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*, 8<sup>th</sup> 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.

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## Course Delivery and Technology

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**Lecture Delivery:** This course is delivered remotely and will use a combination of synchronous and asynchronous learning components. You are expected to be online during the scheduled live lecture times (typically once a week), although live lectures should normally be recorded and available for later viewing. Time slots that are not used for live lectures will be used for answering student questions, similar to office hours held in a class room. 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 platform used for streaming the live lectures (Zoom or Cisco WebEx), and 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 most 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 the 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. The TA will may also post short videos.

**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](http://centre.cc.umanitoba.ca/wp-content/uploads/2020/04/Student-Connectivity-Recommendations.pdf)

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## Assessments and Grading Scheme

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**Crowdmark:** All assessments in this course will be conducted using the Crowdmark software, an online grading tool. 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).

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

|            |     |                                       |
|------------|-----|---------------------------------------|
| Tests (3)  | 75% | (25% each, covering specific modules) |
| Final Exam | 25% | (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 completed at least three of the four assessments, and to have received a passing mark in at least two of these assessments.

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## Tests and Exam

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**Tests:** There will be three 75-minute tests, currently scheduled for October 7, November 6 and December 9, 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 and you provide me with acceptable documentation. In such a case, the weight of a missed test will be transferred to the final exam, which will then count for 50% your final mark for the course. The weight of at most one test can be moved to the final this way.

**Final Exam:** The Final Exam will be scheduled by the Registrar's office during the University-wide examination period taking place on December 12-23. 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 within two weeks of the test being written.

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### Important Dates

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

| Date       | Information                             |
|------------|---|
| Sept 9     | First lecture – No Lab                  |
| Sept 16    | First Lab                               |
| Sept 22-23 | End of the registration revision period |
| Oct 7      | Test 1 (Modules 1 and 2)                |
| Oct 12     | Thanksgiving Day - no classes           |
| Nov 4      | Test 2 (Modules 3 and 4)                |
| Nov 9-13   | Fall Term break - no classes or lab     |
| Nov 23     | Last day to VW the course               |
| Dec 9      | Test 3 (Modules 5 and 6)                |
| Dec 11     | Last lecture                            |
| Dec 12-23  | Final Examination Period                |

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

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### Outline of Covered Topics and Approximate Timeline

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

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## Respectful Behaviour in the Online Classroom

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For any 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 and turn off your video.

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## Class Communications

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The University requires all students to activate an official U of M email account. You should be using this for all communications between your 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](http://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.

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## Copyrights

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**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/](http://www.umanitoba.ca/copyright/).

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## Academic Integrity

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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](http://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/](http://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.

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## ROASS Schedule A

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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](http://www.sci.umanitoba.ca/statistics/courses-and-programs/outlines).