STAT 2400 Section A01
Introduction to Probability
Winter 2020

Time	MWF 9:30 a.m. – 10:20 a.m.
Location	136 Art Lab
CRN	51089

Instructor	Andrew Morris 324 Machray Hall Telephone: 204-480-1073 Email: Andrew.Morris@umanitoba.ca

Web Pages	UM Learn: `http://umanitoba.ca/umlearn` Statistics: `http://umanitoba.ca/statistics`
Office Hours:	Monday 11:30 a.m. – 12:30 p.m. Tuesday 5:45 p.m. – 6:45 p.m. Wednesday 11:30 a.m. – 12:30 p.m.

If the above times are not convenient for you, please email or speak to me to arrange an alternate time to meet. I will do my best to return all emails within 24 hours.

Calendar Description

(Lab Required) Basic probability, discrete distributions including binomial, hypergeometric, geometric and Poisson, joint distributions, applications involving discrete random variables. This course is not available to any student who has previously obtained credit for the former STAT 3500. Prerequisites: STAT 1150 (C), STAT 2000 (B), or STAT 2001 (B); and one of MATH 1232 (C), MATH 1690 (C), MATH 1700 (B), MATH 1701 (B), MATH 1710 (B), or the former MATH 1730 (B).

Textbook

The textbook for this course is

Weiss, N.A. (2006), *A Course in Probability*, Pearson Ed. (Addison-Wesley).

A copy of the textbook will be available on four-hour reserve at the Science Library. The course follows the textbook very closely and there will be suggested problems from the text for each section which may appear on the term tests or final exam.

The following books are also available on four-hour reserve if you would like supplementary resources:

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

Evaluation

Term Tests (2)	50%
Final Examination	50%

The following are the minimum percentage grades required to receive each of the various letter grades: A^+ (90%), A (80%), B^+ (75%), B (70%), C^+ (65%), C (60%), D (50%).

Exam Information

- There will be two term tests, **tentatively** scheduled for **Wednesday February 5** and **Wednesday March 11** during the tutorial time.
- Your best term test will be worth 30% of your final grade and the other will be worth 20%. The second term test is not cumulative.
- The term tests will consist entirely of long answer questions.
- Material to be covered on the tests will be announced in advance in class.
- The final exam is 3 hours in duration and will be scheduled by the Student Records Office. The final exam is cumulative.
- The final exam will consist entirely of long answer questions.
- There are no deferred term tests.
- If you miss a term test, you will be assigned a mark of zero, unless acceptable documentation is provided. You must also contact your instructor within 48 hours if a term test is missed.
- If you miss one term test, the other term test will be worth 25% of your final grade and the final exam will be worth 75% (provided you have the appropriate documentation).
- If you miss both term tests, the final exam will be worth 100% of your final grade (provided you have the appropriate documentation).

For the term tests and the final examination: (i) nonprogrammable handheld calculators are permitted (graphing calculators are **not** permitted), (ii) electronic devices, such as cell phones or headphones, are prohibited. There will be no formula sheet.

Course Notes

Course notes will be posted in advance on UM Learn. You should print them out and bring them to class. Note that the notes do not include most proofs or the solutions to most examples, which will be done in class. If you miss a class, you will have to borrow a classmate's notes.

Tutorials

The tutorial for this class is scheduled for every Wednesday from 2:30 p.m. to 3:45 p.m. in Room 111 Armes. The first tutorial will be Wednesday, January 15. Although attendance in the tutorials is not mandatory, you are strongly encouraged to attend. The T.A. will go over practice problems from the previous week's classes. All material covered in the tutorials may appear on the term tests or final exam.

Assignments

There will be no formal assignments in this course. However, numerous practice problems will be posted for each unit. Students are strongly encouraged to try these practice problems on a regular basis.

Voluntary Withdrawal

The voluntary withdrawal date is **March 18** (by which time you will have received your marks for both term tests).

Academic Dishonesty

It is important that you understand what constitutes academic dishonesty and that you are familiar with the very serious consequences. Links to resources that describe academic dishonesty (including plagiarism, cheating, inappropriate collaboration and examination impersonation, as well as typical penalties) can be found at:

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

Copyrighted Material

All course notes, assignments, tests, exams, practice exams and solutions are the intellectual property of your instructor or the Department of Statistics. Reproduction or distribution of these materials is strictly forbidden without their consent.

Recording of Class Lectures

Your instructor and the University of Manitoba hold copyright over the course materials, presentations and lectures which form part of this course. No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission from your instructor.

Use of Electronics 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. A student may use technology in the classroom setting only for educational purposes approved by the instructor and/or the University of Manitoba Accessibility Services. Students should not engage in electronic messaging/posting activities (e-mail, texting, video or voice chat, social networking (e.g. Facebook)) or electronic gaming during scheduled class time.

Class Communication

The University requires all students to activate an official University email account. Please note that all communication between your instructor and you as a student must comply with the Electronic Communication with Students Policy. Please see

`http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html`

You are required to obtain and use your U of M email account for all communication between yourself and the university.

Student Accessibility Services

If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

`http://umanitoba.ca/student-supports/accessibility`

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. Schedule A will be posted on your instructor's UMLearn page.

Course Outline

Basic Concepts (Weiss, Ch. 1)

- A review of set theory

Mathematical Probability (Weiss, Ch. 2)

- Sample space, events
- Axioms of probability
- Basic probability rules

Combinatorial Probability (Weiss, Ch. 3)

- Counting: permutations and combinations
- The use of counting rules in probability calculations

Conditional Probability and Independence (Weiss, Ch. 4)

- Conditional probability and the general multiplication rule
- Independence
- Bayes' rule

Discrete Random Variables and Probability Distributions (Weiss, Ch. 5)

- Discrete random variables and probability mass functions
- Important counting random variables
- Poisson approximation to the binomial
- Binomial approximation to the hypergeometric

Jointly Discrete Random Variables (Weiss, Ch. 6)

- Marginal and joint probability mass functions
- Conditional probability mass functions
- Independent random variables
- Sums of discrete random variables

Expected Values of Discrete Random Variables (Weiss, Ch. 7)

- Basic properties of expected values
- Mean, variance, covariance and correlation of discrete random variables
- Conditional expectation

Introduction to Continuous Random Variables (Weiss, Ch. 8) (Time permitting)

- Continuous random variables, cumulative distribution functions and probability density functions
- Uniform, exponential and normal random variables
- Mean and variance of continuous random variables