

University of Manitoba – Department of Statistics

STAT 2400: Introduction to Probability

Summer Term 2018

Course Details

Course Number & Title: STAT 2400, Introduction to Probability

Section & CRN: Section A01, CRN: 1213

Course Schedule: Monday/Wednesday/Friday, 10:45 to 12:29 a.m.,
in UNIVERSITY COLLEGE 237.

Lab Schedule: M/W/F, 1:30 pm - 2:30 pm, in UNIVERSITY COLLEGE 237.

Prerequisites: A "C" or better in one of STAT 1000, STAT 1001 or STAT 1150; one of MATH 1232 (C), MATH 1690 (C), MATH 1700 (B), MATH 1701 (B), or MATH 1710 (B). and one of MATH 1232 (C), MATH 1690 (C), MATH 1700 (B), MATH 1701 (B) or MATH 1710 (B).

Instructor Contact Information

Instructor: Kelly Ramsay

Office Location: 347 Machray Hall

Email: ramsayk3@myumanitoba.ca

Office Hours: Mondays 14:30-15:30
Thursdays 10:00 -12:00
or by appointment.

General Goals for this Course and Tips for Success

This course will be focusing on learning the fundamental concepts linked to probability and discrete random variables, and concepts associated with expected value, bivariate and conditional distributions. In this course, you will learn the foundations of probability. Future topics in both statistics and actuarial science will build on this course. You will have an opportunity to develop your mathematical skills, such as proof writing and techniques for problem solving.

Some Tips for Success:

- **Start the problems immediately.** Seriously, start the first day of class and keep up
- If you are struggling with a concept **ASK! ASK! ASK!** Ask the instructor, ask the TA. If you don't, you may end up wasting hours on a concept instead of minutes.
- If a question is taking you a long time to do, or you can't figure it out **ASK! ASK! ASK!**
- Do many problems, go to the labs prepared with the questions you do not understand.

Technology

Crowdmark: The weekly problems, the midterms, and the final exam will be marked using the Crowdmark software, an online grading tool. All exams will be written on provided paper and then scanned for grading. Additional instructions will be given prior to the first assessment to ensure the examinations can be scanned correctly. Upon completion of the quizzes and the midterm an electronically marked copy of your exam will be emailed to your UManitoba e-mail address. I will send out an email when the marked copies have been sent. Please check your spam folders if you do not see it in your inbox. For the weekly problems, you will receive the questions via email from Crowdmark and upload your solution to the provided link

R and R studio: In this class we will be making use of the statistical software R. It is available as a free download from [here](#). While you need to download the original R software in order to install the packages, you may find it easier to use the program using R Studio which may be downloaded at [here](#). Throughout the course I will demonstrate how to carry out some of the calculations using R and will make use of simulations to demonstrate some topics. The statistics computing lab has copies of R Studio installed on all of the computers that you can use during the open lab hours.

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 four-hour 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.

Video links: As an additional reference, I have included some Youtube videos in my notes. These were not created by me and credit is due to the video creator. Because these are not created or monitored, you may find discrepancies between the notes and the videos. If you do, please alert me and of course go with the notes. These videos are **not** intended as a substitute for the notes or lectures, and should only be used to aid in understanding on topics you are struggling with. If you only watch the videos you will miss a very large portion of the material.

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.

Supplementary Problems, Weekly Question and Labs

Weekly Question: Commencing week 2 of the course, there will be an assigned problem due each Sunday at 11:59 p.m. based on the previous week's material. You will receive an email from Crowdmark when the question is available a week beforehand and you must click the link to see the question. You will have a week to submit your solution to the Crowdmark website as either a word document, a pdf, or a scanned pdf to the link where you received the question. You may resubmit your answer as many times as you want up until the submission deadline. After the deadline, you may not resubmit your solution. While the system will allow you to submit a question late up until the marking is finished, you will receive a mark of 0 automatically for all late work. These will be worth 10% of your final grade.

Supplementary Problems: Different lists of supplementary problems will be provided to the students. 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 five or six on each test/exam.

Labs: There are 3 labs every week. Attendance is mandatory, anything taught in the lab is also testable. The Monday and Wednesday labs will consist of questions and/or additional material taught by the TA. You may request problems to be solved prior to the lab via email. Other problems will be taken from the list of supplementary problems. The Friday lab will consist of group work in which you will work on questions in small groups and the TA will come around and assist groups. The TA will also have office hours.

Tests and Exam

Midterm Test: There will be one 105-minute test, accounting for 40% of your final grade. This test is currently scheduled for **Monday, June 04**, during class.

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 final exam would then respectively count for 50% of your final mark for the course.

Should you miss the test and

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

the final exam would then count for 90% of your final mark.

Final Exam: The Final Exam will be held on a date to be selected later by the Registrar's office and will be 3 hours in duration. The exam is on June 29, 2018 at 1:30.

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

Course Evaluation and Grading Scheme

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

Weekly Questions	10%
Midterm Test	40%
Final Exam	50%

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

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

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

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 on vibrate mode and the student should leave the classroom before using it.

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 <http://umanitoba.ca/copyright/>.

Outline of Covered Topics and Approximate Timeline

Chapter and Title	Approx. Duration (in lectures)
Basic Concepts (Weiss, Chap. 1 and 2)	2
– A review of set theory	
– Sample space, events	
– Axioms of probability and basic probability rules	
Combinatorial Probability (Weiss, Chap. 3)	4
– Counting: permutations and combinations	
– The use of counting rules in probability calculations	
Conditional Probability and Independence (Weiss, Chap. 4)	4
– Conditional probability and the general multiplication rule	
– Independence	
– Bayes' rule	
Discrete Random Variables and Probability Distributions (Weiss, Chap. 5)	3
– 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, Chap. 6)	4
– 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, Chap. 7)	4
– Basic properties of expected values	
– Mean and variance of discrete random variables	
– Covariance and correlation of discrete random variables	
– Conditional expectation and variance	

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: <http://umanitoba.ca/science/statistics/>.