

University of Manitoba
Faculty of Science
Department of Statistics
Summer 2016: May-June Day

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| Course Title: Introduction to Probability I | Instructor: Dr. Katherine Davies |
| Course: STAT 2400 – CRN 30264 | Office: 330 Machray Hall |
| Class Time: MWF 10:45am-12:30pm | Telephone: (204) 480-1060 |
| Location: 205 Armes | Email: Katherine.Davies@UManitoba.CA |
| Lab: MWF 1:30-2:30pm 205 Armes | Office Hours: M 2:30-3:30pm W 9:00-10:00am |

I encourage you to contact me throughout the course whenever you feel the need. Whether you are asking a question about course material or are requesting to arrange a meeting, you can contact me by phone, email or in person. I have listed office hours above and I will do everything in my power to always be available during those times, however, sometimes important meetings are scheduled at that time without my consent. If an office hour is cancelled, I will notify you and if necessary, substitute it with a new one. These hours are not the only times I am available to you. I will always try to come to the classroom 5 minutes before class begins, and I can usually stay a few minutes after class, should you need to discuss something with me. Outside of my office hours, I welcome you to come to my office at other times which are convenient to you. Please note that I encourage interaction with your peers with respect to learning the material in the course and hence, if you prefer to come as a group to my office, that is okay with me. Often times you cannot make it to my office hours and you may decide to stop by my office on the spur of the moment. If this occurs and I am not busy, I will gladly meet with you. However, if I am busy, I may ask you to come at another time. Obviously, you should not take it personally in this case.

Course Description

This course will introduce you to probability and discrete and continuous random variables. As the undergraduate calendar states, the course will cover basic probability, discrete distributions including binomial, hypergeometric, geometric and Poisson, joint distributions, continuous distributions, statistical inference and applications involving discrete random variables. I will do my best to cover all these topics. Below is an outline of the topics to be covered with reference to textbook chapters:

1. Basic Concepts (Chapters 1 and 2)
2. Combinatorial Probability (Chapter 3)
3. Conditional Probability and Independence (Chapter 4)
4. Discrete Random Variables (Chapter 5)
5. Jointly Discrete Random Variables (Chapter 6)
6. Expected Values of Discrete Random Variables (Chapter 7)
7. Introduction to Continuous Random Variables (Chapter 8)

A more detailed description and timetable are provided at the end of this document.

General Information

The prerequisites for this course are STAT 1000 or STAT 1001 (C) and one of MATH 1232 (C), MATH 1690 (C) or MATH 1700 (B) or MATH 1701 (B). Early in the course, some of the material will involve topics covered in STAT 1000 and throughout the term, various mathematical skills will be required. I realize that the academic background of each student is different, as well as programs of study. I will do my best to teach in a way that is helpful and beneficial to all sorts of students.

On the day of quizzes, attendance in the labs is necessary since this is when your quizzes will take place, though possibly in a different room. In the remaining labs, attendance in the lab is recommended for you in order to get the maximum value out of this course. In these labs, a qualified TA will be present to answer questions you may have and work through suggested practice problems.

Course Objectives and Expectations

My primary objectives in this class are for you to learn the material but also, to have a good experience. I also hope that you will see how useful probability and statistics can be in our everyday lives and perhaps become more interested in Statistics as a discipline of study. In order to achieve these goals, we can have the following agreements.

You can expect me to:

- plan the course and alter that plan as needed;
- provide you with class notes and lots of opportunities to practice applying the course material;
- be respectful, courteous and provide a good learning environment;
- give you feedback as the course progresses, primarily by returning your quizzes and tests in a timely manner, posting test solutions and going over your quiz/test with you should you desire this.

What I expect from you:

- attend class;
- ask questions when you have any, inside or outside of class;
- be courteous and respectful, which includes turning off your cell phone during class, only using a laptop in class for class purposes and not talking while I am lecturing;
- check UM Learn regularly for any news and content updates;
- write your tests legibly and in the order the questions are provided.

Some Advice

This course is **not** one wherein you can succeed by “cramming” for the quizzes/tests and final exam. You **need** to regularly attend the lectures and practice the materials. I also advise you to review the lecture material as soon as possible, preferably reading the class notes ahead of the lectures, and reviewing them after to see if you have any questions. If you have questions, you have several options including your notes and textbook, your classmates and your TA. Of course, I am a resource for you as well!

Course Materials

The **required textbook** for this course is *A Course in Probability* by N.A. Weiss (Addison-Wesley, 2006). This will be used for assigning practice problems and is also a good resource to follow along with in conjunction with your class notes. The book can be purchased at the bookstore and a copy is also on reserve in the Sciences and Technology Library.

There are no assignments to be handed in for credit in this course but you are strongly encouraged to do as many of the practice problems as you can. Each term test will ask for at least one problem taken from those lists, in original or slightly modified form. These lists and other course materials, including course notes, will be posted online on UM Learn. Specific information pertaining to the quizzes, term tests and the exam will also be posted there.

Course Evaluation

The three components to your final grade are three quizzes, two term tests and a final exam. The weights are:

- Quizzes - 15% (5% each)
- Term Tests- 35% (20% for better, 15% for other)
- Final Exam - 50%

For your final grade, I have the following “guarantees”:

| Minimum Percent Grade Required | Letter Grade |
|--------------------------------|--------------|
| 90 | A+ |
| 80 | A |
| 75 | B+ |
| 70 | B |
| 65 | C+ |
| 60 | C |
| 50 | D |

Notes About Quizzes, Term Tests and Final Exam

- The three quizzes will take place during the lab with *tentative* dates as **May 13**, **June 3**, and **June 20** and be 30 minutes in length. The term tests will take place during class with *tentative* date as **May 20** and **June 10** and be 75 minutes in length. Should one of these dates change, you will be informed in advance. The quiz and test questions will require you to write solutions; part marks will be given accordingly. As each quiz/term test date approaches, I will provide you with information about what material each will cover.
- There are **no** makeup quizzes/tests.
- Should you miss a quiz, you will be assigned a grade of zero for the missed quiz unless you:
 1. provide a valid excuse with acceptable documentation,
 2. notify me within 48 hours after the scheduled quiz (phone and e-mail are fine).

Under the above two assumptions, the weight of the missed quiz(zes) shifts to the final exam.

- Should you miss a term test, you will be assigned a grade of zero unless you:
 1. provide a valid excuse with acceptable documentation,
 2. notify me within 48 hours after the scheduled test (phone and e-mail are fine).

Under the above two assumptions, the weight of the missed term test shifts to the final exam.

- Students who miss all the quizzes and midterm test, with or without valid documentation, will be reported to the Dean's office as having completed no term work. This will have repercussions on their ability to write a deferred exam for the course, should such a deferral be requested.
- The final exam, scheduled for **June 23**, will be 3 hours in length and will also require written solutions. More information regarding the final exam will be provided to you as the date approaches. Your quiz, term test and exam questions will be similar to those worked out in class, in your practice problems, and on previous tests/exams.
- The final exam, quizzes and term tests are closed-book and only non-programmable calculators are permitted.

Other Important Information

1. It is your responsibility to be aware of the last day for voluntary withdrawal. For this term, the Registrar's office has this day as **June 9, 2016**.
2. *A Note about Academic Dishonesty*: It is important that you understand what constitutes academic dishonesty and that you are familiar with the consequences. For descriptions of these terms and other issues, please see

<http://umanitoba.ca/science/student/webdisciplinedocuments.html>

3. *Important Note from the Dean of Science*: It is your responsibility to ensure that you are entitled to be registered in this course. This means that you have:
 - the appropriate prerequisites, as noted in the calendar description, or have permission from the instructor to waive these prerequisites;
 - not previously taken, or are concurrently registered in, this course and another that has been identified as "not to be held with" in the course description. For example, BIOL 1000 cannot be held for credit with BIOL 1020.

The registration system may have allowed you to register in this course, but it is your responsibility to check. If you are not entitled to be in this course, you will be withdrawn, or the course may not be used in your degree program. There will be no fee adjustment. This is not appealable. Please be sure to read the course description for this and every course in which you are registered.

Course Timetable

A rough outline of the course timetable, including reference to material, is as follows. At times, we may be behind or ahead of this schedule, but I will do my best to follow this timetable. Also included are **tentative** term test dates and material planned to be covered on each term test.

| <u>Date(s)</u> | <u>Material</u> | <u>Textbook Reference</u> |
|----------------|---|---------------------------|
| May 2-4 | Course Outline and Basic Concepts: review of set theory, sample space, events, axioms of probability and basic probability rules | Chapters 1 and 2 |
| May 6-11 | Combinatorial Probability: permutations and combinations and their use in probability calculations, binomial theorem | Chapter 3 |
| May 13 | Quiz #1 | Chapters 1-3 |
| May 13-18 | Conditional Probability and Independence: conditional probability and general multiplication rule, independence, law of total probability, Bayes' Rule | Chapter 4 |
| May 20 | Term Test #1 | Chapters 1-4 |
| May 18-June 1 | Discrete Random Variables and Probability Distributions: discrete random variables and probability mass functions, important counting random variables, Poisson approximation to binomial, binomial approximation to hypergeometric, functions of discrete random variables | Chapter 5 |
| June 3 | Quiz #2 | Chapter 5 |
| June 1-8 | Jointly Discrete Random Variables: marginal and joint probability mass functions, conditional probability mass functions, independent random variables, sums of discrete random variables | Chapter 6 |
| June 10 | Term Test #2 | Chapters 5 and 6 |
| June 8-17 | Expected Values of Discrete Random Variables: basic properties of expected values, mean, variance and correlation of discrete random variables, conditional expectation | Chapter 7 |
| June 20 | Quiz #3 | Chapter 7 |
| June 20 | Introduction to Continuous Random Variables: continuous random variables, cumulative distribution functions and probability density function, Uniform, exponential and normal random variables, mean and variance of continuous random variables | Chapter 8 |