

University of Manitoba  
Faculty of Science  
Department of Statistics  
Fall 2014

<b>Course Title:</b> Introduction to Probability I	<b>Instructor:</b> Dr. Katherine Davies
<b>Course:</b> STAT 2400 – CRN 11496	<b>Office:</b> 329 Machray Hall
<b>Class Time:</b> MWF 9:30-10:20am	<b>Telephone:</b> (204) 480-1060
<b>Location:</b> 201 Armes	<b>Email:</b> Katherine.Davies@UManitoba.CA
<b>Lab:</b> W 2:30-3:45pm 111 Armes	<b>Office Hours:</b> MW 10:30-11:30am F 2:30-3:30pm

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 time 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 students 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 1700, MATH 1701 or MATH 1690 (C). 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 two term test dates, attendance in the labs is necessary since this is when your term tests 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 course 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 tests in a timely manner, posting test solutions and going over your 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 Desire2Learn 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 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, the statistics lab (311 Machray Hall) 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 (which is located on the second floor of Machray Hall).

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 that you can. Each 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 on Desire2Learn. Specific information pertaining to the term tests and the exam will also be posted there.

## Course Evaluation

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

Term tests - 50% (33% for better test, 17% 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 Tests and Final Exam

- The two term tests will take place during the lab time with tentative dates as **October 8** and **November 5**. Should one of these dates change, you will be informed in advance. The tests will be 90 minutes in length. The questions will require you to write solutions; part marks will be given accordingly. As each term test date approaches, I will provide you with information about what you are required to know for the test.
- Should you miss **one** 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 of the scheduled test (phone and e-mail are fine).

The other test and final exam would then be worth 25% and 75%, respectively.

- Should you miss **both** tests 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 100% of your final grade for the course.
- **There are no makeup tests.**
- Students who miss both tests, 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 will be 3 hours in length and will also require written solutions. The final exam will take place during the December examination period as scheduled by the Registrar's office. More information regarding the final exam will be provided to you as the date approaches. Your 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 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 **November 12, 2014**.
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, STAT 1000 cannot be held for credit with STAT 2220.

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>
September 5	Course Outline	N/A
September 8-12	Basic Concepts: review of set theory, sample space, events, axioms of probability and basic probability rules	Chapters 1 and 2
September 15-24	Combinatorial Probability: permutations and combinations and their use in probability calculations, binomial theorem	Chapter 3
September 26-October 3	Conditional Probability and Independence: conditional probability and general multiplication rule, independence, law of total probability, Bayes' Rule	Chapter 4
<b>October 8</b>	<b>Test #1</b>	<b>Chapters 1-4</b>
October 6-20	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
October 22-31	Jointly Discrete Random Variables: marginal and joint probability mass functions, conditional probability mass functions, independent random variables, sums of discrete random variables	Chapter 6
<b>November 5</b>	<b>Test #2</b>	<b>Chapters 5 and 6</b>
November 3-19	Expected Values of Discrete Random Variables: basic properties of expected values, mean, variance and correlation of discrete random variables, conditional expectation	Chapter 7
November 19-28	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
December 1-3	Review of all Course Material	Chapters 1-8