University of Manitoba
Faculty of Science
Department of Statistics
Fall 2010

Course Title: Introduction to Probability
Course No: 2400
Class Time: MWF 9:30-10:20am
Location: 527 Buller Building
Lab: W 2:30-3:55pm 315 Buller Building

Instructor: Dr. Katherine Davies
Office: 329 Machray Hall
Telephone: (204) 480-1060
Email: katherine_davies@umanitoba.ca
Office Hours: MW 10:30-11:30am, Th 1:30-2:30pm

I encourage students to contact me throughout the course whenever they 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 students to come to my office at other times which are convenient to them. To make an appointment, you can call me in my office or send me an email. 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 at 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 and do not take it personally in this case.

Course Description

This course will introduce students to probability and discrete and continuous random variables. As the undergraduate calender 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 I group these topics 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)
8. Other Important Concepts

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 term test dates, attendance in the labs is necessary since this is where and when your term tests will take place. In the remaining labs, attendance in the lab is recommended for you in order to get the maximum value out of this course. In non-test labs, a qualified TA will be present to answer questions you may have and work through suggested practice problems. Information about your TA will be provided to you when it becomes available.

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 students will see how useful probability and statistics can be in our everyday lives and perhaps become more interested in statistics as a study of discipline.

More specific objectives are listed below. At the completion of this course, you should be able to carry out the following tasks:
1) recall basic probability concepts;
2) interpret and differentiate between various kinds of probability problems;
3) identify any appropriate random variable and its distribution;
4) recall important distributions and their density and distribution functions;
5) determine if two random variables are present and if appropriate, determine their joint distribution;
6) solve a probability problem by producing an organized and detailed solution.

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 and going over it shall you desire this.

What I expect from you:
-attend class;
-ask questions when you have one, inside or outside of class;
-be courteous and respectful, which includes turning off your cell phone during class;
-only use a laptop in class for class purposes;
-check JUMP regularly;
-write your tests legibly and in the order the questions are provided.

Course Materials

There are five components to the course materials that are recommended to succeed in this course: (1) class notes; (2) course textbook; (3) online postings; (4) other relevant material; (5) practice problems.

(1) I have composed a set of **class notes** for this course which will be made available to you. These notes are organized according to the list of topics provided in the course description. These will contain important definitions and theorems, as well as examples to be worked out in class. Additional information may be provided in class and you are expected to include this in your notes. I do recommend you look at these notes prior to class.

(2) 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 alsoon reserve in the Sciences and Technology Library (which is located on the second floor of Machray Hall) and can be borrowed for up to 7 days.

(3) There is no course webpage but the **JUMP** portal will be used for this course. This is where class notes as well as other course related material and announcements will be posted. Keep in mind that I may make announcements or provide material in class and that you are still responsible for these (even though they may not appear on JUMP). In order to use JUMP, you must use your UMnetID. If you choose not to use your UM email account, please have your mail forwarded to an appropriate account, since a circumstance may arise where I will need to contact all students quickly and I may do this using the JUMP distribution list.

(4) There are other resources which might help you in this course, primarily other textbooks. These are *A First Course in Probability* by S.M. Ross (2006) and *Introduction to Probability* by G. Roussas (2007). These two books are NOT required for the course but are good resources for reading about topics from a different perspective. In addition, they provide more examples and problems that you can work through. These books are on reserve in the Sciences and Technology Library and can be borrowed for up to 4 hours at a time.

(5)There are no assignments for this course but sets of **practice problems** from the course textbook will be provided to you. These problems provide you with a way to grasp the material and also test your knowledge. I will regularly post these sets of practice problems and some of these problems will be done in the labs. Answers to the even-numbered problems are listed in the back of the textbook. Besides providing good practice, **I will put at least one practice problem on each of your term tests**. I will also post tests/quizzes from previous years and you can do these as practice for your term tests. Near the end of the term, I will post a previous year's final exam and **one question from this exam will appear on your final exam**.

Course Evaulation

There will be two components to your final grade: 4 term tests and final exam. The weights of these two components are:

Term tests - 50% (**best** 3 out of the 4)

Final Exam - 50%

The 4 term tests will take place during the labs with tentative dates as September 29, October 20, November 10 and December 1. Should one of these dates change, you will be informed in advance. The tests will contain between 5 and 10 problems and be 75 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. There are NO makeup tests. Tests will be returned to you in class and solutions will be posted shortly after. Should you desire to go over your term test, I will gladly meet with you at at

a time convenient for both of us. The final exam will be 3 hours in length and 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.

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

This means, for example, that if you obtain 80% or more, you will receive no worse than an A.

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 17, 2010.
(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 the basic and some subtopics, is as follows. At time we may be behind or ahead, but I will do my best to follow this schedule. Also included are tentative term test dates and material planned to be covered on each term test.

Date(s)	Material	Textbook Reference
September 10	First Class	N/A
September 13-24	Basic Concepts: review of set theory, sample space, events, axioms of probability and basic probability rules	Chapters 1 and 2
September 27-October 1	Combinatorial Probability: permutations and combinations and their use in probability calculations, binomial theorem	Chapter 3
September 29	**Test 1**: In lab; covers Chapters 1 and 2	Chapters 1 and 2
October 4-13	Conditional Probability and Independence: conditional probability and general multiplication rule, independence, law of total probability, Baye's Rule	Chapter 4
October 15-25	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	Chapter 5
October 20	**Test 2**: In lab; covers Chapters 3 and 4	Chapters 3 and 4
October 27-November 3	Jointly Discrete Random Variables: marginal and joint probability mass functions, conditional probability mass functions, independent random variables, sums of discrete random variables	Chapter 6
November 5-24	Expected Values of Discrete Random Variables: basic properties of expected values, mean, variance and correlation of discrete random variables, conditional expectation	Chapter 7
November 10	**Test 3**: In lab; covers Chapters 5 and 6	Chapters 5 and 6
November 26-December 1	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	**Test 4**: In lab; covers Chapters 7 and 8	Chapters 7 and 8
December 3-8	Additional Topics OR Review	N/A