

## STAT 3400 – Introduction to Probability II

**Fall Term – 2012**

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**Course schedule:** Monday/Wednesday/Friday from 9:30 to 10:30 am, in 111 Armes.  
(See course calendar on p. 4.)

**Lab schedule:** Monday from 2:30 to 4 pm, in 111 Armes.  
(See course calendar on p. 4.)

**Office hours:** Monday from 10:30 am to 12:00 pm,  
Thursday from 1:00 to 2:30 pm,  
or by appointment.

**Textbook:** Weiss, N.A. (2006), *A course in Probability*, Pearson Ed. (Addison-Wesley).  
(Bookstore price: around \$120.)

A copy of the textbook should be available on four-hour reserve at the Science Library.  
Also, copies of

- *A First Course in Probability* (S.M. Ross, 2006),
  - *Fundamentals of Probability with Stochastic Processes* (S. Ghahramani, 2005),
  - *Introduction to Probability*, (G. Roussas, 2007),
- are available on two-hour reserve at the Science Library.

**Prerequisites:** STAT 2400 (with a grade of C or better), and a co-requisite of MATH 2720 (or 2721) or MATH 2730 (or 2731).

### Course material available online:

Course material, including course notes and lists of supplementary problems (some taken from the textbook) will be posted on the JUMP portal. Specific information related to tests and exams will also be posted there.

<b>Breakdown of the marks:</b>	Tests (2)	50%	(best test worth 30%, other worth 20%)
	Final Exam	50%	

### **Supplementary problems:**

There are no assignments to be handed in for credit in this course. However, 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.

### **Notes regarding tests and exam:**

- There will be two 90-minute tests, tentatively taking place on Wednesday, October 10 and November 7, between 2:30 and 4 pm. These are scheduled to take place in 208 Armes.
- 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.
- If you miss a test, you will be assigned a mark of zero, unless reasons and acceptable evidence are provided. Make-up tests will not be scheduled.
- Should you miss a test and provide acceptable evidence, the other test and the final exam would then respectively count for 25% and 75% of your final mark for the course.
- Should you miss both tests and provide acceptable evidence, the final exam would then count for 100% of your final mark for the course.

### **Labs:**

There is a ninety-minute lab every week. Attendance is not obligatory, but is very strongly suggested. Also, the first lab will be replaced by a lecture. (See course calendar on p. 4-5.)

During labs, the teaching assistant will generally be solving selected problems (taken from the list of supplementary problems) and answering other questions that you might have.

## **Outline of the covered topics:**

### 1. CONTINUOUS RANDOM VARIABLES AND THEIR DISTRIBUTIONS (Weiss, Chap. 8)

- Continuous random variables, cumulative distribution functions and probability density functions
- Uniform, exponential and normal random variables
- Other continuous random variables
- Functions of a continuous random variable

### 2. JOINTLY CONTINUOUS RANDOM VARIABLES (Weiss, Chap. 9)

- Joint cumulative distribution functions
- Joint and marginal probability density functions
- Conditional density functions
- Independence of continuous random variables
- Functions of many continuous random variables
- Bivariate transformations

### 3. EXPECTED VALUES OF CONTINUOUS RANDOM VARIABLES (Weiss, Chap. 10)

- Basic properties
- Mean, variance, covariance and correlation of continuous random variables
- Conditional expectation
- Link with the discrete case

### 4. GENERATING FUNCTIONS AND LIMITING THEOREMS (Weiss, Chap. 11)

- Moment generating functions
- The law of larger numbers
- The central limit theorem
- Normal approximation of binomial probabilities
- Sums of random variables

### 5. ADDITIONAL OPTIONAL TOPICS

- Bivariate/multivariate normal distributions
- Multivariate transformations
- Joint moment generating functions
- Poisson Processes
- Other statistical applications

## Tentative calendar for the course:

Note the first lecture is on Friday, September 7 and the last one is on Friday, December 5. The first Lab will take place on Monday, September 17. The September 10 lab slot will be used for a regular lecture.

### September 2012:

Monday	Tuesday	Wednesday	Thursday	Friday
3	4	5	6	7 Lecture
10 Lecture + Lecture	11	12 Lecture	13	14 Lecture
17 Lecture + Lab	18	19 Lecture	20	21 Lecture
24 Lecture + Lab	25	26 Lecture	27	28 Lecture

11

### October 2012:

Monday	Tuesday	Wednesday	Thursday	Friday
1 Lecture + Lab	2	3 Lecture	4	5 Lecture
8 Thanksgiving No Classes	9	10 Lecture + Test 1	11	12 Lecture
15 Lecture + Lab	16	17 Lecture	18	19 Lecture
22 Lecture + Lab	23	24 Lecture	25	26 Lecture
29 Lecture + Lab	30	31 Lecture		

13

**November 2012:**

Monday	Tuesday	Wednesday	Thursday	Friday
			1	2 Lecture
5 Lecture + Lab	6	7 Lecture + Test 2	8	9 Lecture
12 Remembrance Day Holiday <b>No Classes</b>	13	14 Lecture <b>Last Day for VW's</b>	15	16 Lecture
19 Lecture + Lab	20	21 Lecture	22	23 Lecture
26 Lecture + Lab	27	28 Lecture	29	30 Lecture

12

**December 2012:**

Monday	Tuesday	Wednesday	Thursday	Friday
3 Lecture + Lab	4	5 Lecture <b>Last Day of Classes</b>	6	7 Examination Period
10 Examination Period	11 Examination Period	12 Examination Period	13 Examination Period	14 Examination Period
17 Examination Period	18 Examination Period	19 Examination Period	20	21
24	25	26	27	28
31				

2

## **Other notes:**

### **About 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) can be found at:

<http://www.umanitoba.ca/faculties/science/undergrad/resources/webdisciplinedocuments.html>

or through the Faculty of Science home page at:

<http://www.umanitoba.ca/faculties/science>

Typical penalties imposed within the Faculty of Science for academic dishonesty are also described.

### **Important note regarding course registration:**

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 an appropriate permission from the instructor to waive these prerequisites;
- have 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.

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** for which you are registered.

### **Important note regarding a possible pandemic:**

Should major disruptions to university activities occur as a result of a pandemic, the course content, marks breakdown, and other provisions of this document may be adjusted as the circumstances warrant.

### **Final Note:**

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