

STAT 3400 – Introduction to Probability II

Winter Term – 2012

- Instructor:** Alexandre Leblanc
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- Course schedule:** Monday/Wednesday/Friday from 9:30 to 10:30 am, in 115 Armes.
(See course calendar on p. 4.)
- Lab schedule:** Monday from 2:30 to 4 pm, in 115 Buller.
(See course calendar on p. 4.)
- Office hours:** To be determined.
- 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.

- Breakdown of the marks:**
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|------------|-----|--|
| 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, a list of supplementary problems will be provided to the students. Each test/exam will ask for at least two problems taken from that list (in original or slightly modified form).

Notes regarding tests and exam:

- There will be two 90-minute tests, tentatively taking place on February 6 and March 12. These will be taking place during the lab, i.e. between 2:30 and 4 pm on Monday.
- 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 the final mark for the course.

Labs:

There is a ninety-minute lab every week. Attendance is not obligatory, but is very strongly suggested. Note, however, that the two tests will take place during the lab. 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:

0. BRIEF REVIEW OF DISCRETE RANDOM VARIABLES (Weiss, Chap. 5-7)

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 Wednesday, January 4 and the last one is on Friday, April 8. The first Lab will take place on Monday, January 16. The January 9 lab slot will be used for a regular lecture.

January 2012:

Monday	Tuesday	Wednesday	Thursday	Friday
2	3	4 Lecture	5	6 Lecture
9 Lecture + Lecture	10	11 Lecture	12	13 Lecture
16 Lecture + Lab	17	18 Lecture	19	20 Lecture
23 Lecture + Lab	24	25 Lecture	26	27 Lecture
30 Lecture + Lab	31			13

February 2012:

Monday	Tuesday	Wednesday	Thursday	Friday
		1 Lecture	2	3 Lecture
6 Lecture + Test 1	7	8 Lecture	9	10 Lecture
13 Lecture + Lab	14	15 Lecture	16	17 Lecture
20 Louis Riel Day No Classes	21 Reading Week No Classes	22 Reading Week No Classes	23 Reading Week No Classes	24 Reading Week No Classes
27 Lecture + Lab	28	29 Lecture		10

March 2012:

Monday	Tuesday	Wednesday	Thursday	Friday
			1	2 Lecture
5 Lecture + Lab	6	7 Lecture	8	9 Lecture
12 Lecture + Test 2	13	14 Lecture	15	16 Lecture Last Day for VW's
19 Lecture + Lab	20	21 Lecture	22	23 Lecture
26 Lecture + Lab	27	28 Lecture	29	30 Lecture

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April 2012:

Monday	Tuesday	Wednesday	Thursday	Friday
2 Lecture + Lab	3	4 Lecture	5 Last Day of Classes	6 Good Friday University Closed
9 Examination Period	10 Examination Period	11 Examination Period	12 Examination Period	13 Examination Period
16 Examination Period	17 Examination Period	18 Examination Period	19 Examination Period	20 Examination Period
23 Examination Period	24	25	26	27
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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.