

STAT 2400 – Introduction to Probability I

Winter Term – 2011

- Instructor:** Alexandre Leblanc
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- Course schedule:** Monday/Wednesday/Friday from 9:30 to 10:30 am, in 315 Buller.
(See course calendar on p. 4.)
- Lab schedule:** Wednesday from 2:30 to 4:00 pm, in 315 Buller.
(See course calendar on p. 4.)
- Office hours:** Tuesday from 9:30 to 11 am and Friday from 10:30 am to 12 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 two-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 1000 and one of MATH 1700 (or 1701) or MATH 1690.
(all with a grade of C or better).

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 (often four or five) 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 9 and March 16. These will be taking place during the lab, i.e. between 2:30 and 4:00 pm on Wednesday.
- 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.)

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. BASIC CONCEPTS (Weiss, Chap. 1 and 2)

- A review of set theory
- Sample space, events
- Axioms of probability and basic probability rules

2. COMBINATORIAL PROBABILITY (Weiss, Chap. 3)

- Counting: permutations and combinations
- The use of counting rules in probability calculations

3. CONDITIONAL PROBABILITY AND INDEPENDENCE (Weiss, Chap. 4)

- Conditional probability and the general multiplication rule
- Independence
- Bayes' rule

4. DISCRETE RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS (Weiss, Chap. 5)

- Discrete random variables and probability mass functions
- Important counting random variables
- Poisson approximation to the binomial
- Binomial approximation to the hypergeometric

5. JOINTLY DISCRETE RANDOM VARIABLES (Weiss, Chap. 6)

- Marginal and joint probability mass functions
- Conditional probability mass functions
- Independent random variables
- Sums of discrete random variables

6. EXPECTED VALUES OF DISCRETE RANDOM VARIABLES (Weiss, Chap. 7)

- Basic properties of expected values
- Mean, variance, covariance and correlation of discrete random variables
- Conditional expectation

7. INTRODUCTION TO CONTINUOUS RANDOM VARIABLES (Weiss, Chap. 8)

- Continuous random variables, cumulative distribution functions and probability density functions
- Uniform, exponential and normal random variables
- Mean and variance of continuous random variables

8. ADDITIONAL OPTIONAL TOPICS

- The central limit theorem and normal approximations to counting random variables
- Statistical applications involving counting random variables
- Other statistical applications

Tentative calendar for the course:

Note the first lecture is on Wednesday, January 5 and the last one is on Friday, April 8. The first Lab will take place on Wednesday, January 19. The January 12 lab will be used for a regular lecture to replace the January 19 lecture (which will be cancelled).

January 2011:

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

February 2011:

Monday	Tuesday	Wednesday	Thursday	Friday
	1	2 Lecture + Lab	3	4 Lecture
7 Lecture	8	9 Lecture + Test 1	10	11 Lecture
14 Lecture	15	16 Lecture + Lab	17	18 Lecture
21 Louis Riel Day No Classes	22 Reading Week No Classes	23 Reading Week No Classes	24 Reading Week No Classes	25 Reading Week No Classes
28 Lecture				9

March 2011:

Monday	Tuesday	Wednesday	Thursday	Friday
	1	2 Lecture+ Lab	3	4 Lecture
7 Lecture	8	9 Lecture + Lab	10	11 Lecture
14 Lecture	15	16 Lecture + Test 2	17	18 Lecture Last Day for VW's
21 Lecture	22	23 Lecture + Lab	24	25 Lecture
28 Lecture	29	30 Lecture + Lab	31	
				13

April 2011:

Monday	Tuesday	Wednesday	Thursday	Friday
				1 Lecture
4 Lecture + Lab	5	6 Lecture + Lab	7	8 Lecture
11 Examination Period	12 Examination Period	13 Examination Period	14 Examination Period	15 Examination Period
18 Examination Period	19 Examination Period	20 Examination Period	21 Examination Period	22 Good Friday University Closed
25 Examination Period	26 Examination Period	27	28	29
				4

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/student/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.