University of Manitoba
Department of Statistics

STAT 3400 – Introduction to Probability II

Fall Term – 2009

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: Monday from 4 to 5:30 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 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).

Webpage for the course: http://home.cc.umanitoba.ca/~leblanc1/index.shtml

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

Breakdown of the marks: Tests (2)   55%   (best test worth 30%, other worth 25%)
Final Exam   45%

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 October 19 and November 16. These will be taking place during the lab, i.e. between 4 and 5:30 pm.
-   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.

Labs:

There is a ninety-minute lab every week. Attendance is not obligatory, but is strongly suggested. Note, however, that the two tests will take place during the lab. (See course calendar on p. 4.) Generally, the teaching assistant will be solving selected problems (taken from the list of supplementary problems) and answering other questions that you might have.

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.

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 September 11 and the last one is on December 9. The first Lab will take place on Monday, September 21.

September 2009:

Monday	Tuesday	Wednesday	Thursday	Friday
7	8	9	10	11 Lecture
14 Lecture	15	16 Lecture	17	18 Lecture
21 Lecture + Lab	22	23 Lecture	24	25 Lecture
28 Lecture + Lab	29	30 Lecture		9

October 2009:

Monday	Tuesday	Wednesday	Thursday	Friday
			1	2 Lecture
5 Lecture + Lab	6	7 Lecture	8	9 Lecture
12 Thanksgiving NO CLASSES	13	14 Lecture	15	16 Lecture
19 Lecture + TEST	20	21 Lecture	22	23 Lecture
26 Lecture + Lab	27	28 Lecture	29	30 Lecture 12

November 2009:

Monday	Tuesday	Wednesday	Thursday	Friday
2 Lecture + Lab	3	4 Lecture	5	6 Lecture
9 Lecture + Lab	10	11 Remembrance Day NO CLASSES	12	13 Lecture
16 Lecture + TEST	17	18 Lecture Last Day for VW's	19	20 Lecture
23 Lecture + Lab	24	25 Lecture	26	27 Lecture
30 Lecture + Lab				12

December 2009:

Monday	Tuesday	Wednesday	Thursday	Friday
	1	2 Lecture	3	4 Lecture
7 Lecture + Lab	8	9 Lecture	10 Examination Period	11 Examination Period
13 Examination Period	14 Examination Period	15 Examination Period	16 Examination Period	17 Examination Period
20 Examination Period	21 Examination Period	22 Examination Period	23 Examination Period	24 4