University of Manitoba
Department of Statistics

STAT 2400 – Introduction to Probability

Summer Term (May - June Day) – 2015

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Course Schedule: Monday/Wednesday/Friday from 10:45 am to 12:30 pm

Lab schedule: Monday/Wednesday/Friday from 1:30 am to 2:30 pm.

Office Hours: Monday/Wednesday from 2:30 to 4:00 pm. Or by appointment.

Textbook: Weiss, N.A. (2006), *A Course in Probability*, Pearson Ed. (Addison-Wesley).

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 four-hour reserve at the Science Library.

Prerequisites: STAT 1000 (or 1001) and one of MATH 1700 (or 1701) or MATH 1690.

Webpage for the course: All course material including hand outs, supplementary problems, assignments and test solutions will be posted on the JUMP portal.

Breakdown of the Marks: Quizzes (4)   20%
Midterm Tests (2)   40%
Final Exam   40%

Supplementary problems:

Throughout the course, there will be suggested exercises from the text for each section as well as additional practice problems provided by myself. These will not be handed in for marks but may be used on the midterms or the final.

Notes regarding Tests and Exam:

- There will be two midterm tests scheduled during the class times. The dates are scheduled for Monday, May 25th and Monday, June 15th.
- There will be 4 quizzes given during the lab times. The dates are scheduled for Monday, May 11th, Wednesday, May 20th, Wednesday, June 3rd, and Wednesday, June 10th.
- The final exam will be held on Thursday, June 26, from 9 am to 12 pm.
- If you miss a midterm test, you will be assigned a mark of zero, unless reasons and acceptable evidence are provided. If you miss a midterm test for an acceptable reason, the weight of the test will be moved to the final exam, there are no makeup tests.
- If you miss a quiz, you will be assigned a mark of zero, unless reasons and acceptable evidence are provided. If you miss a quiz for an acceptable reason, the weight of the other quizzes will be adjusted accordingly.

Labs:

There is a lab scheduled every afternoon there is a class. Attendance in the lab is mandatory. The labs will be a combination of a variety of topics including, but not limited to, proof writing techniques, review of material from prerequisite courses, and further practice problems from the lectures. All material covered in the labs may appear on the quizzes, midterm tests or final exam. Occasionally lab periods will be used for additional instruction time.

Important Dates:

There are no lectures or labs on Monday, May 18h and Friday, May 29th. The final date to voluntarily withdraw from May-June Day courses is Tuesday, June 9th.

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 to students from the Faculty 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 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. 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** for which you are registered.

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) (Time Permitting)

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