University of Manitoba
Department of Statistics

STAT 2400 – Introduction to Probability
Section A01 - CRN 21223

Winter Term (January-April) – 2016

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Course Schedule: Monday/Wednesday/Friday from 9:30 am to 10:20 pm, 527 Buller

Lab schedule: Wednesday from 2:30 pm to 3:45 pm, 111 Armes

Office Hours: Monday/Wednesday from 10:30 to 12:00 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 to d2l.

Breakdown of the Marks: Midterm Tests (2)   50%
Final Exam   50%

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 tentatively scheduled for Wednesday, February 10th and Wednesday, March 23rd during the lab period.
- Your best midterm will be worth 30% and your worst midterm will be worth 20% of your final grade.
- Please check your Aurora exam schedule for the time and location of your final exam.
- 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, your final exam will be worth 70% and the midterm you do write will be worth 30%, there are no makeup tests.

Labs:

There is a lab scheduled every Wednesday afternoon. 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 midterm tests or final exam. Occasionally lab periods may be used for additional instruction time.

Important Dates:

There are no lectures or labs on Monday, October 12th and Wednesday, November 11th. The final date to voluntarily withdraw is Wednesday, November 18th.

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.

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