MATH441, STAT 461/561 Probability, Fall 2017

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Please include MATH441, STAT461, or STAT561 in the subject line of the email to make sure I don't overlook your email.

Textbook: *A First Course in Probability*, 5th or later edition, by Sheldon Ross, for MATH441 or STAT461, and *Statistical Inference*, 2nd edition, by Casella and Berger for STAT561.

Note that the book by Casella and Berger is usually used for the Statistical Inference course taught in the Spring semester, and is important for studying for the qualifying exam (usually taken in the summer after the first year) for graduate students in statistics. The book by Ross is also recommended for graduate students for additional examples.

Assessment

Grading will be based on weekly homework, quizzes or tests (each week will have one homework or one quiz or one test). Assessment will be different for undergraduates versus graduate students.

Undergraduates: Homework, 50%; Quizzes, 15%; Tests, 15%; and Final, 20%.
Graduate students: Homework, 25%; Quizzes, 25%; Tests, 25%; and Final, 25%.

Tests are particularly important in this class for graduate students because the qualifying exam is an in-class test.

Times of tests will be announced in class, so attendance is important to make sure that no quizzes or tests are missed.

Homework assignments will be typeset by the professor so that there is no confusion about different editions of the texts being used. The notation in the two textbooks differs somewhat, and I will point this out in class. Students are not required to follow the notation exactly of either book, as long as there is no confusion.

In many cases, homework problems will be variations of problems that occur in either Ross or Casella and Berger. This is partly to give a greater variety of problems, and partly to make sure that not all homework problems have easily available solutions on the web. It is STRONGLY suggested to work problems from scratch rather than working backwards from a solution when a solution is available. Part of the goal of the course is to develop problem-solving skills for probability problems. Working backwards from solutions that are given is detrimental to this goal. Particularly for graduate students planning to take the qualifying exam, it is important to practice problem-solving without any hint of what the solution is.

Homework

Late homework will be penalized 10% per day. All homework must be printed (not emailed) and turned in either in class or to my office. Sliding homework under the office door is acceptable.

Disability statement

If you have a documented disability that will impact your work in this class, please contact me to discuss your needs. Youll also need to register with the Accessibility Resource Center in 2021 Mesa Vista Hall (building 56) across the courtyard east from the SUB.

Title IX statement

In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered responsible employees by the Department of Education (see pg 15 - http://www2.ed.gov/about/offices/list/ocr/docs/qa-201404-title-ix.pdf). This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity (oeo.unm.edu). For more information on the campus policy regarding sexual misconduct, see: https://policy.unm.edu/university-policies/2000/2740.html

Learning outcomes

We'll cover mostly topics from the listed book.

- be familiar with set theory notation and manipulating equations involving sets
- know the definitions of probability concepts: sample space, events, outcomes, random variables, pdf, pmf, cdf
- be familiar with some named discrete distributions such as discrete uniform, poisson, binomial, negative binomial, geometric, hypergeometric, multinomial
- be familiar with some named continuous distributions such as uniform, normal, exponential, gamma, beta, etc.
- know the definitions of expected value, variance, standard deviation, probability, conditional probability
- know the definitions of joint distributions of random variables
- be familiar with certain formulas, such as Bayes Theorem, total probability, inclusion-exclusion formula, Jensen's ineqality, Bonferroni's inequality
- be familiar with the ideas of an exponential family and generating functions

By the end of the class, the goal is that you will be able to:

- translate word problems into probability problems
- use problem-solving to answer probability problems
- manipulate formulas for expected values, probabilties, condtional probabilities and conditional expectations
- apply calculus techniques such as limits, integration, differentiation, and infinte series to derive probabilities, expected values, limiting distributions, etc.
- use graphical techniques to display distributions