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STAT 421.01: Probability Theory

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STAT 421 Probability Theory

Fall 2018, TuTh 4:00-5:20, Math 211

Course Information

- **Instructor:** David Patterson, Math 208, 243-6748, david.patterson@umontana.edu
- **Textbook:** Probability and Statistics , 3rd or 4th ed., DeGroot and Schervish
- **Prerequisites:** M 273 (Multivariable Calculus), M 307 (Intro to Abstract Math)
- **Software:** Some assignments will require the use of R. R is a free program which can be downloaded from <http://www.r-project.org/>. It is also available in the Math 206 computer lab. I will expect you to learn how to use Latex, a mathematical document preparation program. More details on both programs will be provided on the Moodle page.
- **Office Hours:** See Moodle page

Grading (+/- grading will be used):

- Homework: 20%
- Midterm Exams 1,2: 20% each (dates to be determined)
- Weekly quizzes (10 best, no makeups): 15%
- Final Exam: 25%

STAT 421 is the first semester of a year-long course in probability and mathematical statistics. In the first semester, we will cover Chapters 1-5 and perhaps some of Chapter 6. Use of computer software (R, mainly) will be integrated into the course as needed.

Catalog description:

Offered autumn. Prereq., [M 273](#) or consent of instructor ([STAT 341](#) recommended). Fundamentals of probability; discrete and continuous random variables; expected value; variance; joint, marginal, and conditional distributions; conditional expectations; applications; simulation; central limit theorem; order statistics. Level: Undergraduate-Graduate

Learning Goals:

1. To understand the axiomatic approach to probability, counting and combinatorial methods, and Bayes' Theorem.
2. To understand random variables and their properties, including marginal and conditional distributions, expectation, conditional expectation, covariance and correlation, moment generating functions, and distributions of functions of one or more random variables.
3. To recognize and learn the properties of important probability distributions.
4. To understand the Law of Large Numbers and the Central Limit Theorem and their importance.
5. To gain the ability to prove results in probability.
6. To use statistical software to simulate random phenomena and to carry out probability computations for standard distributions.

Homework

Homework will be assigned every week, to be handed in one week later. Up to two late homeworks will be accepted without penalty if they are handed in by the start of the next class. In addition, your lowest homework score will be dropped. Homework is vital to your success in this class. Working with other students on homework is allowed and even encouraged, so long as you hand in your own work, and do not simply copy someone else's work.

Quizzes

A 10-minute quiz (one problem) will be given every week on current material. No makeups are allowed for any reason. Your 10 best quiz scores are worth 15%.

Midterm Exams

The exams will be partially closed book/closed notes, partially open book/open notes. The exact dates will be given later. If you cannot make it to an exam for a good reason, please let me know well ahead of time.

Final Exam

3:20-5:20 pm, Thursday, December 13.

Important dates:

- **Monday, September 3:** Labor Day, no classes.
- **Monday, September 17:** last day to drop course or change grading option by Cyberbear. A "W" will appear on transcript for courses dropped after this date.
- **Monday, October 29:** last day to drop course. Requires paper form signed by advisor and instructor. Changes after this date require Dean's signature..
- **Tuesday, November 6:** Election Day, no classes, VOTE!!
- **Monday, November 12:** Veteran's Day, no classes.
- **Wed-Fri, Nov. 21-23:** Thanksgiving break, no classes.
- **Friday, December 7:** last day of classes.

Incompletes

Incompletes are given at the discretion of the instructor and are only considered in cases where the student has been in attendance and doing passing work up to three weeks before the end of the semester, and for reasons beyond the student's control and which are acceptable to the instructor, the student has been unable to complete the requirements of the course on time. Negligence and indifference are not acceptable reasons.

Students with disabilities are welcome to discuss accommodations with me.

Academic Honesty

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary action by the University. All students need to be familiar with the Student Conduct Code. You can find it in the A-Z index on the UM home page.