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STAT 421.01: Probability Theory

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STAT 421 Probability Theory

Fall 2021, MWF 12:00-12:50, Math 108

Course Information

- **Instructor:** David Patterson, Math 208, 243-6748, david.patterson@umontana.edu
- **Textbook:** Introduction to Probability, 2nd ed., Blitzstein and Hwang
- **Prerequisites:** M 273 (Multivariable Calculus)
- **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.
- **Office Hours:** See Moodle page

Grading (+/- grading will be used):

- Homework: 30%
- Midterm exams 1,2 and final exam (all equal): 70%

STAT 421 is the first semester of a year-long course in probability and mathematical statistics.

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.

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 6:** Labor Day, no classes.
- **Monday, September 20, 5 pm:** last day to drop classes with refund and no entry on transcript. After this date through Nov. 1, W will appear for dropped classes.
- **Thursday, November 11:** Presidents' Day, no classes, offices closed.
- **Monday, November 1:** last day to drop without Dean's signature; W will appear on transcript. After this date, WP or WF will appear on transcript.
- **Wednesday-Friday, November 24-26:** Thanksgiving break
- **Friday, December 10:** last day of classes. Last day to drop (requires Dean's signature). Last day to change to CR/NCR grading.
- **Friday, December 17: 8:00-10:00 am:** Final exam. Final will not be given early.

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.