STAT 4750/7750 - Introduction to Probability Theory
Syllabus - Fall 2019

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Class times: Tuesday/Thursday, 2:00pm-3:15pm in Agriculture 2-06

Office hours: Thursday 11am-2pm or by appointment

Mandatory textbook: *Introduction to Probability and Mathematical Statistics*, Second Edition. Authors: Bain and Engelhardt. See Canvas *Cengage e-books* and the last page of this syllabus.

Important dates:

Last day to register, add, or change sections of a course	August 26, 2019
Last day to drop course without a grade	September 23, 2019
Last day to withdraw from a course	December 2, 2019

Course philosophy: This course introduces elementary probabilistic models and methods through rigorous mathematics. *It is "impossible" to succeed in this course without good command of multivariate calculus techniques*, including but not limited to chain rule, integration by parts and change of variable for univariate and multivariate integration (Jacobian). Please review these techniques at home. No background in statistics is required to succeed in this course.

Grading: Students will be graded on the letter +/- system based on the following:

Homework	20%
Midterm I	25%
Midterm II	25%
Final	30%
Piazza answers (bonus)	+0.5% for each endorsed answer (by me), max. 4%

The "total" grade shown on Canvas will be "lower" than the actual grade that you get at the end of semester, because it does not take into the fact that exams have higher weights than homework.

Homework: Homework is critical in this course and will require a significant amount of time to complete. There will be about 11 homework assignments selected from the exercises of the textbook. Homework assignments will be posted on Canvas one week in advance. Homework must be turned in in paper form at the beginning of class on the due date; late homework will not be accepted.

Clearly write your **course number(4750 or 7750), name and assignment number on the top of the first page of your homework sheet.**

Assignments to undergraduate students sometimes have bonus, so the total scores shown in Canvas are typically higher than the actual total scores.

ONE LOWEST homework will be dropped at the end of semester. For example, suppose there are only 4 homework this semester (we actually have 11). Someone earns 110, 90, 80, 90, and each with total points 100. Then 80 will be dropped, because 80/100=0.8

is the lowest (the total points plays a role here). The percentage from homework in the final grade is calculated as (110+90+90)/(100*3)*20(the weight of HW) = 19.33.

Piazza (http://piazza.com/missouri/fall2019/stat47507750) Sign up for Piazza via the link. Please direct all course-related questions (e.g. on homework, book and lecture materials) to Piazza. **Emails on these questions will NOT be replied.**

Before the homework due date, posting complete solution of homework questions on Piazza is considered a breach of academic integrity, but hints, ideas or steps without details are acceptable.

If you answer questions and your answer is endorsed by me, you would earn bonus 0.5% for each such answer toward your final grade percentage.

Exams: All exams must be taken at the scheduled time unless a verifiable documented excuse is presented prior to the exam. The final exam will be comprehensive, with an emphasis toward the last portion of the course.

- Midterm I: Oct. 1, in class
- Midterm II: Nov. 5, in class
- Final Exam: Monday, Dec. 9, 7:30am-9:30am

All exams are closed book. You are allowed to bring an 8.5″ by 11″ page of crib sheet (both sides) for each of Midterms I and II. "Three" such sheets are allowed for the final exam. Please submit the crib sheet with the exam.
Make-up exam policy: make-up exams will not be approved unless valid supporting documentation is provided at least **one week** before the exam. If you miss the exams due to an emergency, you must email the instructor with details of your situation as soon as possible, and provide documentation.

Graduate credit: To receive graduate credit, graduate students must enroll in STAT 7750. Graduate students will be assigned additional problems in each homework.

Academic integrity: Academic integrity is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards breaches of the academic integrity rules as extremely serious matters. Sanctions for such a breach may include academic sanctions from the instructor, including failing the course for any violation, to disciplinary sanctions ranging from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, collaboration, or any other form of cheating, consult the course instructor.

Academic accommodations: If you anticipate barriers related to the format or requirements of this course, if you have emergency medical information to share with me, or if you need to make arrangements in case the building must be evacuated, please let me know as soon as possible.

If disability related accommodations are necessary (for example, a note taker, extended time on exams, captioning), please register with the Disability Center (http://disabilitycenter.missouri.edu), S5 Memorial Union, 573- 882-4696, and then notify me of your eligibility for reasonable accommodations. For other MU resources for persons with disabilities, click on "Disability Resources" on the MU homepage.

No recording lectures without permission: University of Missouri System Executive Order No. 38 lays out principles regarding the sanctity of classroom discussions at the university. The policy is described fully in section 200.015 of the Collected Rules and Regulations. **In this class, students may NOT make audio or video recordings of course activity, except students permitted to record as an accommodation under section 240.040 of the Collected Rules.** All other students who record and/or distribute audio or video recordings of class activity are subject to discipline in accordance with provisions of section 200.020 of the Collected Rules and Regulations of the University of Missouri pertaining to student conduct matters.

Those students who are permitted to record are not permitted to redistribute audio or video recordings of statements or comments from the course to individuals who are not students in the course without the express permission of the faculty member and of any students who are recorded. Students found to have violated this policy are subject to discipline in accordance with provisions of section 200.020 of the Collected Rules and Regulations of the University of Missouri pertaining to student conduct matters.

References besides the textbook:

- Hogg, R. V., McKean, J. W. and Craig, A. T. (2012), *Introduction to Mathematical Statistics*, 7th ed.

Course topics will correspond to Chapters 1-7 of the textbook.

1. Elements of Probability
    - Sample spaces
    - Definition and properties of probability
    - Conditional probability and independence
    - Counting techniques
2. Random variables and distributions
    - Discrete and continuous distributions; cdf, pdf
    - Expected value
    - Moment generating functions
3. Probability distributions
    - Discrete distributions: Bernoulli, binomial, geometric, hypergeometric, negative binomial, Poisson
    - Continuous: uniform, exponential, gamma, normal
    - Location and scale families (if time permits)
4. Joint distributions
    - Joint discrete distributions; multinomial
    - Joint continuous distributions; bivariate normal
    - Covariance, mean and variance of linear combinations
    - Correlation coefficient; Schwarz inequality (not in the textbook)
    - Conditional expectation
5. Functions of random variables
    - Transformation methods
    - Jacobian
    - Sums of random variables
    - Order statistics (if time permits)
6. Limiting distributions (if time permits)
    - Central limit theorem; convergence in distribution
    - Additional limit theorems; convergence in probability: law of large numbers; delta method

AutoAccess
Mizzou Digital Content Solution

This course is part of the AutoAccess program designed to reduce the cost of course materials for students. You will be able to access the digital content for this course through Canvas on the **first day of class** automatically. Your student account will be charged for the cost of the digital course materials.

You have access to your **Bain and Engelhardt (1991), *Introduction to Probability and Mathematical Statistics***, through Cengage Unlimited – a digital subscription service. With Cengage Unlimited you can access ALL Cengage materials you are using in ANY courses AND a library of 22,000+ ebooks, study guides and reference materials.

Through this program, the lowest cost content has been sourced compared to competitive market rates. You can choose to opt out through the **September 3, 2019** and receive a refund**. If you opt out of Cengage Unlimited, you will be opting out of all Cengage AutoAccess material for the semester.**

You will receive a welcome email from The Mizzou Store, so please watch your inbox. The AutoAccess welcome email will provide course, content cost, opt out deadline and process.

Title: Introduction to Probability and Mathematical Statistics
Author: Lee J. Bain and Max Engelhardt
Edition: 2nd
ISBN: 9780534380205

For help accessing your digital content in Canvas, please refer to the help guides: https://www.cengage.com/coursepages/ColumbiaStudents

If you have any questions please contact The Mizzou Store via phone at 573-882-7611 or email at autoaccess@missouri.edu.

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