STAT 3470.02
Introduction to Probability and Statistics for Engineers
Autumn 2022 Course Syllabus

Instructor: Olivia Cleymaet
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Lectures: Posted on Carmen (see Course Structure)
Office Hours: Monday 2:00-3:00, Thursday 11:00-12:00 over Zoom (via this link), or by appointment

Email Correspondence: Please begin subject with "STAT 3470." In order to protect your privacy, all email correspondence must be conducted using a valid OSU name.# email account. Any email from a non-OSU account will be ignored. I will attempt to answer emails within 48 hours; however, due to the large volume of emails this may not always be possible. Please consider whether the question has already been answered in the syllabus, the notes, a Carmen announcement, or the textbook before sending an email.

Course Description: This 3 credit hour course is an introduction to probability and statistics for engineers. Topics covered include probability, Bayes Theorem, discrete and continuous random variables, probability distributions, expected values, sampling distributions, point estimation, confidence intervals, hypothesis testing, and least squares regression models.

General Education (GE) Requirement: This course satisfies the General Education foundation requirement in Mathematical and Quantitative Reasoning or Data Analysis which has the following goals and expected learning outcomes:

Goals: Successful students will be able to apply quantitative or logical reasoning and/or mathematical/ statistical methods to understand and solve problems and will be able to communicate their results.

Expected Learning Outcomes (ELOs): Successful students are able to:

1. Use logical, mathematical and/or statistical concepts and methods to represent real-world situations.
2. Use diverse logical, mathematical and/or statistical approaches, technologies and tools to communicate about data symbolically, visually, numerically and verbally.
3. Draw appropriate inferences from data based on quantitative analysis and/or logical reasoning.
4. Make and evaluate important assumptions in estimation, modeling, logical argumentation and/or data analysis.

5. Evaluate social and ethical implications in mathematical and quantitative reasoning.

This course also satisfies the Legacy General Education requirement in Data Analysis. which has the following goals and expected learning outcomes:

Goals: Students develop skills in drawing conclusions and critically evaluating results based on data.

Expected Learning Outcomes:

1. Students understand basic concepts of statistics and probability.
2. Students comprehend methods needed to analyze and critically evaluate statistical arguments.
3. Students recognize the importance of statistical ideas.

Course Prerequisites: Math 1152, 1161.xx, 1172, 1181H, or equiv, or permission of instructor. Not open to students with credit for 3440, 3450, 3450.01, 3450.02, 3460, 3470, or 3470.01.

Course Textbook and WebAssign: The required textbook for this course is *Probability and Statistics for Engineering and the Sciences,* (9th edition) by Jay L. Devore, and will be provided through CarmenBooks. This course will utilize the WebAssign resources associated with the textbook for homework assignments. A link to the host website for WebAssign is accessible from the course website in Carmen.

Course Structure

This course will be administered primarily via Carmen, with homework administered via WebAssign. Please be sure to familiarize yourself with how to navigate both, and check in regularly on both to ensure you are keeping up with course content and deadlines.

Course Website: Important announcements, course materials, homework assignments (via WebAssign, linked in Carmen), supplemental references, and other information will be posted on Carmen. This will be the primary means of delivering course materials and announcements throughout the course. Video lectures will be posted on the course website, and discussion boards are available for course content questions.

Course Pacing: This is a fast-paced course with an ambitious curriculum required by the College of Engineering. Because of this, along with the cumulative nature of the material, it can be very difficult to catch up if you fall behind. With this in mind please contact me early if you are struggling with this course for any reason, and don't hesitate to ask any questions you have on the material. It is far easier to address issues early in the semester rather than waiting until later, and I have much more flexibility to accommodate difficulties if I can address them sooner rather than later.

Lectures: Approximately 3 hours of video lecture will be posted to Carmen weekly. Each week's content schedule will be posted on Tuesdays, and this will be the primary lecture posting day. If lectures are split between two topic areas (and correspondingly, distinct homework assignments), some lectures may be posted on Friday. Please follow lectures carefully. They will be the primary avenue for presenting course content, and may cover content beyond the textbook.

Homework: Homework will be administered via WebAssign, with assignments due every 1-2 weeks. Each homework will cover one major topic area. Homework due dates will be on Mondays or Thursdays. It is the students' responsibility to check Carmen and WebAssign regularly and be aware of deadlines; late homework will not be accepted without an extension arranged in advance, except in the case of personal or medical emergencies.

Homeworks will be automatically graded based on final solutions, but I highly recommend writing out full solutions to the problems as if you were submitting a written homework assignment to ensure a complete understanding of the material. Two attempts are allowed for each problem without penalty, with a 10% penalty for each additional attempt, to encourage carefully solving problems and asking for help when necessary rather than attempting to solve problems by brute force.

Exams: There will be 3 exams for this course, administered through Carmen. Each exam will be available throughout a 48-hour window, with no additional time constraints. You are permitted to use any notes or course materials for the exams, but other online resources are prohibited, as is any collaboration with other students. The length of the exams will be analogous to a 1-2 hour in-person exam. I recommend setting aside 3 hours during the 48-hour window to complete the exam, which should be sufficient to comfortably complete it if you are well-prepared.

The coverage of the exams will be as follows: the first exam will cover probability; the second exam will focus on estimation and hypothesis testing, but will be cumulative since this material relies heavily on probability; the final exam will be comprehensive with an emphasis on regression.

Extensions: If you will not be able to finish a homework assignment on time, email me in advance of the deadline. I am happy to make reasonable arrangements to accommodate students who fall behind for any reason. Homework deadlines are scheduled in line with the lecture posting schedule as a guideline for when work should be completed to avoid falling behind.

The windows of availability for exams are firm, and will only be altered in the case of emergencies or unavoidable conflicts.

Communication: Do not attempt to contact me via WebAssign. I do will not see questions or extension requests from that platform. Instead, send me a Carmen message or email (**include STAT 3470 in the subject line if communicating via email**), or post on Carmen's discussion boards.

Office hours: I will hold two scheduled office hours via Zoom each week, and may be available by appointment as well. Please don't hesitate to come to my office hours if you have any questions or would like to discuss anything related to the class. Prerecorded lectures can never perfectly cover the material for every student, and I can do a lot more to help you understand the material in a one-on-one setting.

Additional Resources: The Math/Stat Learning Center (MSLC) provides drop-in tutoring services online and in person. You can check the website via this link for hours of availability. Additional information will be posted on Carmen once the Autumn schedule is finalized.

Grading Policy: Final course grades will be determined according to the following weights:

- **Homework** (30%) Homework will be administered via WebAssign, with assignments due every 1-2 weeks, and posted at least one week in advance of the deadline. Assignments will be equally weighted. To accommodate WebAssign's sometimes picky tendencies regarding solution formatting, overall homework grades will be increased by 5%.
- **Exams** (70%) There will be three exams. Your best exam score of the three will be weighted at 30% of your final grade, and the other two at 20% each.

A letter grade will be assigned based on the following rubric: A: 93-100, A-: 90-92.9, B+: 87-89.9, B: 83-86.9, B-: 80-82.9, C+: 77-79.9, C: 73-76.9, C-: 70-72.9, D+: 67-69.9, D: 63-66.9, D-: 60-62.9, E: below 60. No "curve" will be applied to final grades. Instead grades for individual exams will be adjusted appropriately, and overall homework grades adjusted as stated above.

Instructor Responsibilities:

- Clearly present course material, including practical motivation and application where possible.
- Answer student questions clarifying and elaborating on concepts covered in course.
- Assign homework to develop students' understanding.
- Design exams to effectively evaluate and reinforce students' understanding.
- Assign grades fairly and in a way that accurately reflects the development of students' knowledge and ability.

Student Responsibilities:

- Review prerequisite materials if necessary. This course assumes fluency in calculus and elementary algebra.
- Approach homework with the goal of developing understanding of course topics.
- Log in frequently to Carmen and WebAssign to complete course materials and stay up-to-date on announcements and newly posted materials.
- Ask questions when necessary to further understanding of course material.
- Complete assignments by posted deadlines.
- Put forth a reasonable effort to engage with and learn course content.

Academic Misconduct

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct and this syllabus may constitute Academic Misconduct.

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: Any activity that tends to compromise the academic integrity of the University, or subvert the educational process. Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an excuse for academic misconduct, so I recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Disability Services: The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Mental Health Statement: As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a students ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Lifes Counseling and Consultation Service (CCS) by visiting https://ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at https://suicidepreventionlifeline.org.

Note: This syllabus is a guide for the course and is subject to change with advance notice.

Plan for STAT 3470 - Autumn 2022 Subject to Change			
Week	**Topics Covered**	**Textbook Sections**	**Dates**
1	Course Introduction and Overview Probability Spaces	2.1, 2.2, 2.3	08/23-08/29
2	Probability Rules and Counting (continued) Conditional Probability and Independence	2.3, 2.4, 2.5	08/30-09/05
3	EDA and Random Variables Discrete Distributions	1.x, 3.1, 3.2, 3.3	09/06-09/12
4	Discrete Distributions (continued) Continuous Random Variables	3.4, 3.6, 4.1, 4.2	09/13-09/19
5	Continuous Distributions Random Vectors	4.3, 4.4, 5.1	09/20-09/26
6	Covariance and Independence Sampling Distributions and CLT **Exam 1: 10/02-10/03**	5.2, 5.3, 5.4, 5.5	09/27-10/03
7	Introduction to Estimation Methods of Point Estimation	6.1, 6.2	10/04-10/10
8	Confidence Intervals (Part 1) **Fall Break**	7.x	10/11-10/17
9	Confidence Intervals (Part 2) Hypothesis Testing (Part 1)	7.x, 8.x	10/18-10/24
10	Hypothesis Testing (Continued)	8.x,14.x	10/25-10/31
11	Statistical Methodology and Ethics in Practice **Exam 2: 11/06-11/07**		11/01-11/07
12	Linear Regression	12.x	11/08-11/14
13	Transformations Multiple Regression	13.x	11/15-11/21
14	**Thanksgiving Break - No New Lectures**		11/22-11/28
15	Multiple Regression (Continued) **Final Exam: 12/04-12/05**	14.x	11/29-12/06