STAT 3450: Basic Statistics for Engineers
Autumn 2024

Instructor: Michelle Duda
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Office Hours: Tuesdays and Thursdays 2:00 to 3:00 PM via Carmen Zoom
Class Time/Location: Virtual – Asynchronous
Course Website: Canvas (access through https://carmen.osu.edu/)

Course Description: STAT 3450 provides an introduction to probability and statistics targeted mainly toward students studying mechanical, welding, and biomedical engineering. Topics covered include probability, random variables, the normal and binomial distributions, confidence intervals for means, hypothesis tests for means, multi-factor experiments, and experiments with blocking.

Expected Learning Outcomes:

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:

1.1 Use logical, mathematical and/or statistical concepts and methods to represent real-world situations.
1.2 Use diverse logical, mathematical and/or statistical approaches, technologies and tools to communicate about data symbolically, visually, numerically and verbally.
1.3 Draw appropriate inferences from data based on quantitative analysis and/or logical reasoning.
1.4 Make and evaluate important assumptions in estimation, modeling, logical argumentation and/or data analysis.
1.5 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: Calculus, integration, exponential function, finite and infinite sums, union and intersection of sets. Prerequisite courses are Math 1152 (153), 1161.xx, 1172 (254), or 1181.

Textbook: *Principles of Statistics for Engineers and Scientists, 2nd Edition,* by William Navidi Available digitally via McGraw Hill Connect.

Homework Assignments
There will be weekly homework assignments due on Fridays at 11:59PM through McGraw-Hill Connect. Periodically, there will be hand-written homework where students will be expected to show their work and upload a pdf file to Carmen. The lowest two homeworks will be dropped. Thus, there are no extensions for homework. If you miss a homework, it will count as one of your dropped scores.

Quizzes
There will be weekly quizzes due on Mondays at 11:59PM through McGraw-Hill Connect. The lowest two quizzes will be dropped. Thus, there are no extensions for quizzes. If you miss a quiz, it will count as one of your dropped scores.

Exams
There will be three proctored exams on campus. Two midterm exams will be given: the first is on **Wednesday, September 25** and the second is on **Thursday, November 7**. The final exam is scheduled for **Monday, December 9. Times and locations can be found in the course calendar.**

Important things to know about exams:

- For both midterms and the final exam, students will be allowed to bring one 8 ½ by 11 inch sheet of notes (front side only) that will be turned in with the exam. No other materials are allowed during the exams.
- The final exam will be cumulative, with an emphasis on those topics covered after the second midterm.
- At a minimum, a basic calculator will be necessary for all exams. A TI 83/84/Nspire is preferred and will discussed throughout the course.

Grading: Your final grade will be based on the following weighting structure:

Component	Percentage
Homework	13%
Quizzes	12%
Exam 1	25%
Exam 2	25%
Final Exam	25%

Final course grades will be assigned based on the standard grading scale.

A: 93-100; A-: 90-92; B+: 87-89; B: 83-86; B-: 80-82;
C+: 77-79; C: 73-76; C-: 70-72; D: 60-69; F: below 60

This grading scale is subject to adjustment if it appears necessary due to overall class performance. These adjustments will only raise a student's grade, not lower it.

Tutor Room and Help Hours

The Mathematics and Statistics Learning Center (MSLC) will be offering both in person and online tutoring via Zoom. More details will be shared on Carmen once available.

Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct **http://studentlife.osu.edu/csc/**

Special Accommodations

The university strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's **request process**, managed by Student Life Disability Services. 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.

Sexual Misconduct/Relationship Violence Statement

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at **http://titleix.osu.edu** or by contacting the Ohio State Title IX Coordinator at **titleix@osu.edu**.

Diversity Statement

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Mental Health

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 student's 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 Life's Counseling and Consultation Service (CCS) by visiting **ccs.osu.edu** or calling **614292-5766**. 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 1-800-273TALK or at **suicidepreventionlifeline.org**.

Tentative Course Schedule

Aug 20	1.1-1.3	Sampling, numerical, and graphical summaries
Aug 22	3.1	Probability rules, equally likely outcomes
Aug 27	3.2	Conditional probability, independence
Aug 29	3.3	Discrete RVs, probability mass functions
Sept 3	3.3	Expected values, variances
Sept 5	3.3	Continuous RVs, density and distribution functions
Sept 10	3.3	Means and variances of continuous RVs
Sept 12	4.1	Binomial distribution
Sept 17	4.1	Binomial distribution
Sept 19	4.3	Normal distribution

Sept 24	4.3, 4.7	Linear comb. of normal RVs, normal probability plots
Sept 25		**EXAM I - 6:00 - 7:30 PM - Location: SOE 0001**
Oct 1	4.8	Central Limit Theorem
Oct 3	5.1-5.2	CI for mean (known variance)
Oct 8	5.2	Sample size calculation
Oct 10		**AUTUMN BREAK – NO CLASSES**
Oct 15	5.4	t-intervals for mean (unknown variance)
Oct 17	6.1	Hypothesis tests for population means
Oct 22	6.1	Hypothesis tests for population means
Oct 24	6.2, 6.6	Significance levels, p-values
Oct 29	6.4	t-tests
Oct 31	6.7	Power
Nov 5	6.7	Power
Nov 7		**EXAM II - 6:00 - 7:30 PM - Location: SOE 0001**
Nov 12	7.1, 7.3	Two sample t-tests

Nov 14	9.1	One factor experiments, randomization, F-tests ANOVA
Nov 19	9.1	ANOVA
Nov 21	9.2	Pairwise comparisons
Nov 26	9.3	Two factor experiments, balanced vs. unbalanced
Nov 28		**THANKSGIVING – NO CLASSES**
Dec 3	9.4	Randomized complete block designs
Dec 9		**FINAL EXAM - TIME TBD - 6:00 PM or 8:00 PM** **- Location: TBD**

I reserve the right to change items on this syllabus – any changes as well as official due dates and exam dates will be announced in Carmen!