STAT 3450: Basic Statistics for Engineers
Autumn 2023

Overview

Instructor: Patrick McHugh
Email: mchugh.118@osu.edu
Office Hours: (Tentatively) Mondays 4-5pm and Thursdays 12-1pm, in Cockins Hall, room TBD (see "Syllabus" page on Carmen for further information), also available by appointment and generally in person after lecture
Class Time/Location: T/Th 4:10-5:05pm, EA 160 (in person)
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.

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

Expected Learning Outcomes: This course satisfies the General Education (GE) requirement in Data Analysis.
ELO1: Understand basic concepts of statistics and probability.
ELO2: Comprehend methods needed to analyze and critically evaluate statistical arguments.
ELO3: Recognize the importance of statistical ideas.

STAT 3450 helps students achieve these ELOs by teaching students the basic concepts and techniques of statistics, including populations and samples, probability, expectations and variances, the binomial and Normal distribution, the Central Limit Theorem, confidence intervals and hypothesis testing, type I and II errors, power, factorial experiments, numerical summaries, and graphical summaries of data.

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.

Communication

Communication Method
All class announcements, date changes, and other important updates will be announced on the Announcements page of the Carmen course module.

Contacting Me
I am available to students any time via email at mchugh.118@osu.edu or by Carmen message. A response can generally be expected within 24 hours on business days, and often faster than that.

Assignments

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. If you miss a homework, it will count as one of your dropped scores. Three attempts will be given on each homework problem.

Quizzes
There will be weekly quizzes due on Mondays at 11:59PM through McGraw-Hill Connect. The lowest three quizzes will be dropped. If you miss a quiz, it will count as one of your dropped scores. **One attempt** will be given on quizzes.

Late Assignments
For homework assignments and quizzes, the tentative plan is to adopt the Carmen countdown clock system, which deducts 5% from the assignment grade every hour past the deadline.

Missed Assignments
You are allowed two dropped homework assignments and three dropped quizzes to cover any circumstances that prevent you from submitting them on time without question. If you have extenuating circumstances that cause you to miss **more than two homeworks or three quizzes**, i.e., an extended leave from class, please get in touch with me and we can work together on making them up.

If you have a "valid" reason for missing one or two assignments, i.e., short term personal event, injury, etc., I completely understand, and you do not need to contact me to let me know. Again, that is why you are allowed multiple dropped assignments. An extension/excusal on assignments for anything other than long term or multiple instances of extenuating circumstances will not be granted.

Exams
Exams will be administered in person at our regular class time and location. Two midterm exams will be given: the first is on Thursday, September 28 and the second is on Thursday, November 9. The final exam is scheduled for Wednesday, December 13.

Important things to know about 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.
- Exams will generally not be curved individually; rather, any curve deemed necessary will most likely be added to the final course grade.

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

Component	Percentage
Homework	10%
Quizzes	10%
Exam 1	25%
Exam 2	25%
Final Exam	30%

Grade Disputes
Grade disputes are welcome and will be handled on a case-by-case basis. To be considered for credit, any dispute must be submitted to me in writing via email or Carmen message within **one week** of the return of the graded assignment/quiz/exam.

Final Grades
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.

Resources

Tutor Room and Help Hours
In addition to my office hours, help is available from the Mathematics and Statistics Learning Center (MSLC) five days a week. Help is available in person in Cockins Hall (tutoring will be on the first floor but room number TBD, see "Syllabus" page on Carmen) and on Zoom.

MSLC Schedule: https://mslc.osu.edu/tutoring/statistics-shared-office-hours
Zoom Link: Coming soon, see "Syllabus" page on Carmen

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; 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 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 suicidepreventionlifeline.org.

Religious Accommodations
It is Ohio State's policy to reasonably accommodate the sincerely held religious beliefs and practices of all students. The policy permits a student to be absent for up to three days each academic semester for reasons of faith or religious or spiritual belief.

Students planning to use religious beliefs or practices accommodations for course requirements must inform the instructor in writing no later than 14 days after the course begins. The instructor is then responsible for scheduling an alternative time and date for the course requirement, which may be before

or after the original time and date of the course requirement. These alternative accommodations will remain confidential. It is the student's responsibility to ensure that all course assignments are completed.

Schedule

Tentative Course Schedule

Date	Sections of Book	Topic
Aug 22	1.1-1.3	Sampling, numerical and graphical summaries
Aug 24	3.1	Probability rules, equally likely outcomes
Aug 29	3.2	Conditional probability, independence
Aug 31	3.3	Discrete random variables, probability mass functions
Sep 5	3.3	Expected values, variances
Sep 7	3.3	Continuous random variables, density and distribution functions
Sep 12	3.3	Means and variances of continuous RVs
Sep 14	4.1	Binomial distribution
Sep 19	4.1	Binomial distribution
Sep 21	4.3	Normal distribution
Sep 26	4.3, 4.7	Linear combinations of normal RVs, normal probability plots
Sep 28		EXAM 1
Oct 3	4.8	Central Limit Theorem
Oct 5	5.1-5.2	Confidence interval for mean (known variance)
Oct 10	5.2	Sample size calculation
Oct 12		FALL BREAK (NO CLASS)
Oct 17	5.4	t-intervals for mean (unknown variance)
Oct 19	6.1	Hypothesis tests for population mean
Oct 24	6.1	Hypothesis tests for population mean
Oct 26	6.2, 6.6	Significance levels, p-values
Oct 31	6.4	t-tests
Nov 2	6.7	Power
Nov 7	7.1, 7.3	Two sample t-tests
Nov 9		EXAM 2
Nov 14	9.1	One-factor experiments, randomization, F-tests
Nov 16	9.1	ANOVA
Nov 21	9.2	Pairwise comparisons
Nov 23		THANKSGIVING (NO CLASS)
Nov 28	9.3	Two-factor experiments, balanced vs. unbalanced
Nov 30	9.4	Randomized complete block designs
Dec 5	9.4	Randomized complete block designs
Dec 13		FINAL EXAM

Disclaimer

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!