# STAT 3450.02: Basic Statistics for Engineers

Autumn 2025

### Course Overview

This is a **2-credit-hour** course delivered **Asynchronous Online**, with in-person exams.

### Instructor

Instructor: Eloise E. Kaizar

Email: kaizar.1@osu.edu

Office Location: Cockins Hall 404B

Phone: (614) 247-2585

Office Hours: Wednesday 4-5 in office; Thursday 9-10 on Zoom; by appointment

Course Website: Canvas (access through https://carmen.osu.edu/)

Note: My preferred method of contact is through email.

### 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 (ELO)

This course satisfies the General Education (GEN) foundation requirement in **Mathematical and Quantitative Reasoning or Data Analysis**.

**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.

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 (GEL) requirement in **Data Analysis**.

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

**Expected Learning Outcomes:**

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

### How This Online Course Works

**Mode of Delivery:** This course is 100% online. There are no required sessions when you must be logged in to Carmen at a scheduled time. However, exams are taken in person.

**Pace of Online Activities:** This is an asynchronous course, meaning you can complete the work at a time that is convenient for you each week. However, assignments and quizzes have specific deadlines, and it is crucial to stay on track with the weekly schedule. I recommend setting aside dedicated time each week to engage with the lecture materials and practice problems. Video content is typically posted on Wednesdays and Fridays.

### Credit Hours and Work Expectations

This is a 2-credit-hour course. According to Ohio State policy (go.osu.edu/credithours), students should expect around 6 hours of engagement with the class each week to receive a grade of C average. Actual hours spent will vary by student learning habits and the assignments each week.

### Participation Requirements

Because this is an online course, your attendance is based on your online activity and participation. This includes completing weekly homework assignments and quizzes. Office hours and seeking assistance at the Mathematics and Statistics Learning Center (MSLC) are optional but highly encouraged for those who would like additional support.

### Course Communication Guidelines

**Preferred Contact Method:** My preferred method of contact is email. You can expect a response from me within 48 business hours.

**Writing Style:** All formal written communication should be professional, using proper grammar, punctuation, and clear, concise language.

**Tone and Civility:** Please be respectful and thoughtful in all communications with your peers and the instructor. Disagreements should be handled with professionalism and a focus on the course material.

**Protecting and Saving Your Work:** I highly encourage you to compose your work in a word processing tool outside of Carmen and save it regularly. This will ensure you have a backup in case of browser time-outs or connectivity issues.

### Course Materials, Technologies and Resources

#### Textbooks:

* *Principles of Statistics for Engineers and Scientists*, 2nd Edition, by William Navidi. Available digitally via McGraw Hill Connect. Students who did not opt out of CarmenBooks will be able to access an electronic version of this textbook via a link in Carmen.

#### Course Technology:

* **Technology support:** For help with your password, university email, Carmen, or any other technology issues, contact the Ohio State IT Service Desk. Standard support hours are available at it.osu.edu/help, and support for urgent issues is available 24/7.
* **Required Equipment:**
  + Computer: current Mac (MacOs) or PC (Windows 10) with high-speed internet connection
  + Other: a mobile device (smartphone or tablet) to use for BuckeyePass authentication
* **Carmen Access:** You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen.

#### Tutor Room and Help Hours:

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

### Assignments and Grading

**Homework Assignments (13%):** There will be weekly homework assignments typically due on Fridays at 11:59 PM. These are typically assigned and submitted through McGraw-Hill Connect, though may occasionally be assigned via Carmen. The lowest two homework scores will be dropped, so no extensions are given for homework.

**Quizzes (12%):** There will be weekly quizzes due on Mondays at 11:59 PM through Carmen. The lowest two quizzes will be dropped, so no extensions are provided for quizzes.

**Exams:** There will be three proctored exams on campus: two midterm exams and a cumulative final exam.

* **Exam I (25%):** Monday, September 29, from 6:00 to 7:30 PM in Hitchcock Hall room 131.
* **Exam II (25%):** Wednesday, November 12, from 6:00 to 7:30 PM in Hitchcock Hall room 131.
* **Final Exam(25%):** Day and location are TBD, but the time will be 6:00 PM or 8:00 PM. The final exam will be cumulative, with an emphasis on topics covered after the second midterm.

For all exams, students may bring one 8 ½ by 11 inch sheet of notes (front and back), which is not turned in with the exam. A basic calculator is necessary for all exams. No other materials are allowed.

**Late Assignments:** Late or missing assignments will receive a score of zero. Since the lowest two homework and quiz scores are dropped, this policy provides a buffer for unforeseen circumstances. Contact the instructor as soon as possible if you have a single circumstance that is not documented by Student Life Disability Services but may result in multiple missed assignments.

**Grading Scale:** Final course grades will be assigned based on the grading scale below. This grading scale is subject to adjustment only to raise a student’s grade, not lower it.

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| --- | --- |
| Grade | % |
| 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+ | 67-69 |
| D | 60-66 |
| E | <60 |

### Academic Policies

#### 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 3335-5-48.7 (B)). For additional information, see the Code of Student Conduct.

#### Copyright for Instructional Materials:

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

#### Intellectual Diversity:

Ohio State is committed to fostering a culture of open inquiry and intellectual diversity within the classroom. This course will cover a range of information and may include discussions or debates about controversial issues, beliefs, or policies. Any such discussions and debates are intended to support understanding of the approved curriculum and relevant course objectives rather than promote any specific point of view. Students will be assessed on principles applicable to the field of study and the content covered in the course. Preparing students for citizenship includes helping them develop critical thinking skills that will allow them to reach their own conclusions regarding complex or controversial matters.

#### Religious Accommodations:

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Civil Rights Compliance Office. (Policy: Religious Holidays, Holy Days and Observances)

#### Accessibility Accommodations for Students with Disabilities:

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom.  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.

If you are ill and need to miss class, including if you are staying home and away from others while experiencing symptoms of a viral infection or fever, please let me know immediately. In cases where illness interacts with an underlying medical condition, please consult with Student Life Disability Services to request reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or slds.osu.edu.

#### 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 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

### Tentative Course Schedule

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| Date | Textbook Sections and Topic |
| **Aug 27** | 1.1-1.3 Sampling, numerical, and graphical summaries |
| **Aug 29** | 3.1 Probability rules, equally likely outcomes |
| **Sep 3** | 3.2 Conditional probability, independence |
| **Sep 5** | 3.3 Discrete RVs, probability mass functions |
| **Sep 10** | 3.3 Expected values, variances |
| **Sep 12** | 3.3 Continuous RVs, density and distribution functions |
| **Sep 17** | 3.3 Means and variances of continuous RVs |
| **Sep 19** | 4.1 Binomial distribution |
| **Sep 24** | 4.1 Binomial distribution |
| **Sep 26** | 4.3 Normal distribution |
| **Sep 29** | **EXAM I** - 6:00 - 7:30 PM - Location: HI0131 |
| **Oct 1** | 4.3, 4.7 Linear comb. Of normal RVs, normal probability plots |
| **Oct 3** | 4.8 Central Limit Theorem |
| **Oct 8** | 5.1-5.2 CI for mean (known variance) |
| **Oct 10** | 5.2 Sample size calculation |
| **Oct 15** | 5.4 t-intervals for mean (unknown variance) |
| **Oct 17** | **FALL BREAK** |
| **Oct 22** | 6.1 Hypothesis tests for population means |
| **Oct 24** | 6.1 Hypothesis tests for population means |
| **Oct 29** | 6.2, 6.6 Significance levels, p-values |
| **Oct 31** | 6.4 t-tests |
| **Nov 5** | 6.7 Power |
| **Nov 7** | 7.1, 7.3 Two sample t-tests |
| **Nov 12** | **EXAM II** - 6:00 - 7:30 PM - Location: HI0131 |
| **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** | 9.4 Randomized complete block designs |
| **Dec 3** | 9.4 Randomized complete block designs |
| **Dec 10** | To Be Determined |
| **FINAL EXAM** | TIME TBD - 6:00 PM or 8:00 PM - Location: TBD |

*The instructor reserves the right to change syllabus items, with all official due dates and exam dates announced in Carmen.*