Syllabus

STAT 3470 – Introduction to Probability and Statistics for Engineers

Autumn 2025

3 Credit Hours

Course overview

Instructor

- Andrew Kerr
- kerr.109@osu.edu (preferred method of contact)
- Course Time/Location: MWF, 1:45 – 2:50 PM in Jennings Hall, room 155
- Office: Cockins Hall, 212B
- Office Hours: Friday: 12:00 – 1:30PM. Additional Hours Available by Appointment.
- Zoom Link: available on Carmen

Teaching Assistant

- Dino Qian
- qian.554@buckeyemail.osu.edu
- Office Hours: Monday, 3:00 – 4:00 PM
  - Zoom Link: available on Carmen

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.

Course expected learning outcomes

By the end of this course, students should successfully be 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.

General education goals and expected learning outcomes

As part of the Data Analysis category of the General Education curriculum, this course is designed to prepare students to be able to do the following:

1. 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.
2. Students develop skills in drawing conclusions and critically evaluating results based on data.
    a. Students understand basic concepts of statistics and probability.
    b. Students comprehend methods needed to analyze and critically evaluate statistical arguments.
    c. Students recognize the importance of statistical ideas.

How this online course works

Mode of delivery

We will meet for lecture 1:45 PM – 2:50 PM Monday, Wednesday, and Friday of each week (when classes are being held) in room 155 of Jennings Hall. The material will be presented in a lecture format, with blank guided notes that follow the lecture slides available on Canvas each week.

Credit hours and work expectations

This is a **3-credit-hour course**. According to Ohio State policy (go.osu.edu/credithours), students should expect around 9 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

You should plan to attend each lecture, as slides will not be posted on Canvas. If you need to miss a lecture, please get notes from another student in class. If you have questions over missed material, I am happy to answer questions but cannot lecture the material again. You should also complete the homework assignments as appropriate.

Course materials and technologies

Textbooks

Required

Probability and Statistics for Engineering and the Sciences (9th edition), by Jay Devore and access to the accompanying homework management system WebAssign.

The electronic version of this textbook and WebAssign are offered through CarmenBooks. The eBook, and homework assignments are all located within this resource.

https://affordablelearning.osu.edu/carmenbooks/students Instructions for accessing this course's WebAssign page will be posted on Carmen. The course instructors and graders will have access to data collected by WebAssign, including all recorded homework solution attempts.

Course technology

Technology support

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, 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.

- Self-Service and Chat support: it.osu.edu/help
- Phone: 614-688-4357(HELP)
- Email: 8help@osu.edu
- TDD: 614-688-8743

Technology skills needed for this course

- Basic computer and web-browsing skills
- Navigating Carmen (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)

Required Equipment

- Computer: current Mac (MacOs) or PC (Windows 10) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed and tested
- Microphone: built-in laptop or tablet mic or external microphone

- Other: a mobile device (smartphone or tablet) to use for BuckeyePass authentication

Required software

- Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365. Full instructions for downloading and installation can be found at go.osu.edu/office365help.

Carmen Access

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass website for more information: https://buckeyepass.osu.edu/
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the Duo Mobile application to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357(HELP) and IT support staff will work out a solution with you.

Grading and instructor response

How your grade is calculated

Assignment Category	Points and/or Percentage
Homework Assignments (WebAssign)	25%
Midterm 1	25%
Midterm 2	25%
Final Exam	25%

Assignment Category	Points and/or Percentage
Total	**100%**

Description of major course assignments

Homework Assignments

- **Description**

Homework will be administered via WebAssign, with assignments due every week. Each homework will cover one major topic area. Homework due dates will be on Mondays except when we need to work around a holiday or exam. It is the students' responsibility to check Carmen and WebAssign regularly and be aware of deadlines. The lowest two homework assignments will be dropped, so there are no late assignments. 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. Three 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

- **Academic integrity and collaboration guidelines**

You are encouraged to work with others in your class, but you need to submit your own work. Collaboration and studying with others can help in learning material, but be sure to practice working on your own as well, as that will provide the best practice for exams.

Exams

There will be 3 **in person** exams for this course. You are permitted one page (two-sided, 8.5"x11") of **hand-written** notes during the first two exams, and two such pages on the final exam. Two midterm exams will be given: the first is on **Tuesday, October 7** (6:00 – 7:45 PM in HI0131) and the second is on **Tuesday, November 18** (6:00 – 7:45 PM in MP1000). The final exam will occur during finals week on **Wednesday, December 17** (6:00 – 7:45 PM in EA0160).

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.

At a minimum, a basic calculator will be necessary for all exams. A TI 83/84/Nspire is preferred and will be discussed throughout the course

- **Academic integrity and collaboration guidelines**

Exams will be completed on your own. Only a pen/pencil, approved calculator, and the notes sheet(s) are permitted during the exams.

Late assignments

The two lowest grades of the homework assignments through WebAssign will be dropped, so no late submissions will be accepted for credit.

Make-up exams will be given at the instructor's discretion. If you are going to miss an exam, please email me **before** the exam. If you do not contact me, you will earn a zero for the exam. Documentation may be required to have a make-up exam given.

Grading Scale

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

- 93-100: A
- 90-92: A–
- 87-89: B+
- 83-86: B
- 80-82: B–
- 77-79: C+
- 73-76: C
- 70-72: C–
- 67-69: D+
- 60-66: D
- Under 60: E

Academic policies

Academic integrity policy

See **Descriptions of major course assignments**, above, for my specific guidelines about collaboration and academic integrity in the context of this online class.

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/

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.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct web page (go.osu.edu/coam)
- Ten Suggestions for Preserving Academic Integrity (go.osu.edu/ten-suggestions)

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.

Creating an environment free from harassment, discrimination, and sexual misconduct

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Civil Rights Compliance Office:

Online reporting form at http://civilrights.osu.edu/,

Call 614-247-5838 or TTY 614-688-8605,

Or Email equity@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Civil Rights Compliance Office to ensure the university can take appropriate action:

All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.

The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

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.

Your 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.

Accessibility accommodations for students with disabilities

Requesting accommodations

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.

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 Office of Civil Rights Compliance: https://civilrights.osu.edu/

Policy: Religious Holidays, Holy Days and Observances

Course Schedule

Refer to our Carmen course page for up-to-date assignment due dates.

Tentative Schedule

WEEK	MONDAY	WEDNESDAY	FRIDAY
1	8/25 No Class	8/27 Sample Spaces and Events	8/29 Axioms and Properties of Probability
2	9/1: No Class - Labor Day	9/3 Counting Techniques Conditional Probability	9/5 Law of Total Probability Independence
3	9/8 Discrete Random Variables (DRV)	9/10 Probability Distributions (DRV)	9/12 Expectation and Variance (DRV)
4	9/15 Binomial Distribution	9/17 Poisson Distribution Negative Binomial Distribution	9/19 Continuous Random Variables (CRV)
5	9/22 Percentiles Expected Value and Variance (CRV)	9/24 Normal Distributions	9/26 Exponential and Gamma Distributions
6	9/29 Joint Probability Distributions	10/1 Joint Probability Distributions	10/3 Conditional Distributions
7**	10/6 Conditional Expectation	10/8 Covariance and Correlation	10/10 Sampling Distribution of a Statistic
8	10/13 Sample Mean Distribution Central Limit Theorem	10/15 Introduction to Estimation and Inference	10/17 No class – Fall break
9	10/20 Point Estimation	10/22 Method of Moments Estimation	10/24 Maximum Likelihood Estimation
10	10/27 Intro to Confidence Intervals	10/29 Large Sample Intervals for a Population Mean	10/31 Large Sample Intervals for a Population Proportion
11	11/3 Confidence Intervals for Means of Normal Populations	11/5 Hypothesis Testing Procedures	11/7 Hypothesis Tests for a Population Mean
12	11/10 The p-value Approach	11/12 Hypothesis Tests for a Population Proportion	11/14 Simple Linear Regression (SLR)
13**	11/17	11/19	11/21

	More on SLR	Estimation in SLR	Inference in SLR
14	11/24 Model Checking in SLR	11/26 No Class – Thanksgiving	11/28 No Class – Thanksgiving
15	12/1 Transformations in SLR	12/3 Prediction in SLR	12/5 Multiple Regression
16	12/8 Multiple Regression	12/10 Goodness-of-fit Tests	12/12 No Class
FINALS	12/15	12/17 Final Exam	12/19

** A midterm exam is administered during this week on Tuesday.