

WELCOME TO: STAT 3470.01 – AUTUMN 2023 INTRODUCTION TO PROBABILITY AND STATISTICS FOR ENGINEERS

Course overview

Instructor & Office Hours

Instructor: Dr. Sanjeevani Weerasingha

Email address: weerasingha.1@osu.edu

Office: Cockins 205C

Office hours (in-person): Mondays, Wednesday and Friday 11:20 am - 11:50 am, or by appointment.

Office hours (online Zoom): Tuesday and Thursday 9:30 am – 10:30 am

Office hours Zoom link: Please find the office hours zoom link in CarmenCanvas course page.

Teaching Assistant

Teaching Assistant: Jae Chang

Email address: chang.2090@osu.edu

Office Hours: Tuesday and Thursday 10:20 am – 11:15 am

Office hours Zoom link: Please find the office hours zoom link in CarmenCanvas course page

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. A more detailed list of topics can be found in the tentative schedule below.

Prerequisites

MATH 1152, 1161.xx, 1172, 1181H, 153, or 254, or equivalent.

Course 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.

Course delivery

This course meets on **Mondays, Wednesdays, and Fridays in Hitchcock Hall 131 from 10:20 AM - 11:15 AM**. Lectures will be delivered in person during the scheduled class meeting times. Students are expected to attend and participate in these in-person class meetings. Class meetings will be used to provide in-depth investigation of the topics for the week using a lecture format. Students will participate in these class sessions by engaging in discussions prompted by the instructor and by asking and answering questions. Students should plan to take notes during class.

Required Course Materials

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.

<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.

Online Materials

- Instructions, materials, assignments, announcements, and other information will be posted to the course Carmen site.
- Students are asked to use the Carmen discussion boards to ask questions or otherwise discuss topics relevant to this course. These will not be graded. However, students are expected to use these discussion boards to ask any **content questions rather than emailing the instructor**.
- There will be a discussion board dedicated to the material from each assignment, but students are free to create their own boards as well. Students are encouraged to answer each other's questions and to read the questions in the board before posting a new one in case their question has already been answered.
- Students are expected to check the Carmen course site regularly, and are encouraged to customize Carman notifications to stay abreast of course announcements and activities (<https://resourcecenter.odee.osu.edu/carmencanvas/setting-notification-preferences>).
- In particular, important communication in the course will be done through Carmen announcements. Students are responsible for any information that is included in the announcements, so they are expected to read those fully.

TopHat

- We may use TopHat for quizzes. Students are also required to register with TopHat, which is free for Ohio State University students. Please go to the TopHat home page (<https://tophat.com/>) and either login (<https://app.tophat.com/login>) or signup for an account (<https://app.tophat.com/register/>). Make sure you are using the latest version of the app or are accessing it through a browser.
- TopHat is already connected to the CarmenCanvas course, so it should be listed as one of your courses when you sign in. If not, you can use the join code **151693**. Please contact your instructor if you have difficulty accessing TopHat. You are expected to own a device (phone, tablet, laptop, etc.) that can access TopHat.

Carmen

This class will use Carmen. In Carmen, you will find copies of the syllabus, homework assignments, lecture notes and other important documents. Carmen will also be used to keep track of your assignment grades. Additionally, materials for lectures will be uploaded to Carmen.

Course technology

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help/hours>, and support for urgent issues is available 24x7.

- **Self-Service and Chat support:** <http://ocio.osu.edu/selfservice>
- **Phone:** 614-688-HELP (4357)
- **Email:** 8help@osu.edu
- **TDD:** 614-688-8743

Technology skills necessary for this specific course

- Navigating Carmen; the following website may help you if you encounter difficulties with Carmen: <https://resourcecenter.odee.osu.edu/canvas/>.
- Navigating WebAssign; the following website may help you if you encounter difficulties with WebAssign: <http://support.cengage.com/>. Only Cengage support personnel can assist you with linking your WebAssign account to the WebAssign course.
- Navigating Carmen quizzes.

Necessary equipment

- Computer: current Mac (OS X) or PC (Windows 10+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed (if virtual office hours)
- Microphone: built-in laptop or tablet mic or external microphone(if virtual office hours)

Grading and faculty response

Assignment or category	Percentage
Quizzes	15
Homework	25
Midterm 1	17.5
Midterm 2	17.5
Final Exam	25
Total	100

Homework

- Graded homework problems will be assigned for each chapter (the last two chapters will be combined).
- Students must submit solutions to these assignments online, through the WebAssign interface. Due dates will be posted on Carmen and Webassign.
- If you answer a question part correctly on the number specified attempts (Ex: on the first 3 attempts), you get full credit. You can keep answering after that (up to 100 attempts) but you will receive no credit for answers beyond the specified attempts (Ex: 3 attempts). However, this may be useful if later parts of the problem depend on that part.
- Students are encouraged to seek help from the discussion boards and instructor office hours for these problems. Students are allowed to use any type of material to help with understanding concepts but are not allowed to search for solutions to the specific problems on the assignment.
- Please read the instructions on Webassign for each homework set carefully, as there are sometimes problems you are told to skip or given hints for.

Quizzes

- There are 10 Quiz assignments that you will complete during the semester. Quizzes will be given frequently using **Carmen** and/or, **TopHat** and/or, **WebAssign** interface. These quizzes are meant to motivate you to participate actively inside or outside of the class and keep you up with the material introduced during class.
- Quizzes will be assigned in a regular basis. Students must submit solutions to these assignments online through **Carmen** and/or, **TopHat** and/or, **WebAssign** interface.
- Due dates will be posted on Carmen and Webassign. Students may have specific attempts (Ex: 2 attempts). There will be a time limit (Ex: one hour for a quiz or 24 hrs for a quiz).
- Students are allowed to use any material to help with understanding concepts but are not allowed to search for solutions to the specific problems on the assignment. Please read the instructions on Webassign or Carmen for each quiz and homework set carefully, as there are sometimes problems you are told to skip or given hints for, and there may be extra credit problems designated. The lowest quiz score will be dropped.

Important:

- For both homework and quizzes, please be very careful about your rounding.
- Always round to the exact number of decimal places asked for.
- If there are intermediate steps in a problem, please hold several decimal places beyond those required for the final answer if you need to round intermediate steps.
- Please use SALT or other technology for more precision rather than statistical tables.

- Failure to do these things may cause you to lose points even if your method was correct. If you followed these steps and still got an answer wrong due to rounding discrepancies, feel free to contact your instructor.

Exams:

- There will be two midterm exams and one final exam. Each exam contains both multiple choice and short answer questions. Exams are in person on paper.
- The dates for the exams given below are tentative and I reserve the right to change the dates of any and all exams; at least one week of notice will be provided in case of a change.
- Please note that solutions, not answers, will be graded; a correct answer alone will not get full credit if the steps leading to it are not clear and/or correct.
- You MUST HAVE your Buck-ID available to show the proctor during the exam.

The exams are closed book. Calculators will be allowed on the exam as long as they cannot connect to the internet. Please note that solutions, not answers, will be graded; a correct answer alone will not get full credit if the steps leading to it are not clear and/or correct.

As the exams take place during regular class periods, make-up exams will not be given except in case of an emergency or due to conflicts with other university activities. If you have a documented class conflict, there will be a make up exam scheduled. If you have an emergency or extended illness and are going to miss an exam, please notify Dr. Weerasingha as soon as possible so arrangements can be made. Please also have documentation (doctor's note, etc.) that says you were too sick to take the exam (not just that you visited the doctor). Your documentation must be approved prior to your being allowed to take a make-up.

If you missed the exam for any unexcused reason, you might not be allowed to make it up and may receive a zero. If you are allowed to take a make-up, you may receive a penalty of up to 25% of the total points. Possible on the exam. Any missed exams with no communication to us within 24 hours (except for extreme emergencies) may receive a 0.

Midterm Exam 1:

Monday October 02, 2023.

Midterm Exam 2:

Monday November 13, 2023.

Final exam:

Friday December 08, 2023 – from 6 pm -7:45 pm in McPherson Lab 1000

Late assignments

It is important for you to keep up with the work in this course, both for your own stress levels, and so that we can all be on the same page when we're discussing material.

Late Homework assignments will be accepted for 24 hours after the original due date with a 1% deduction per hour. After this, no late assignments will be accepted. Do not wait until the last moment to begin working on assignments.

Generally, late Quiz assignments are not accepted. Please plan your time so that you can complete assignments far enough in advance to avoid any last-minute problems.

If exceptional circumstances (sudden onset of illness, unexpected family situations, etc.) arise, contact the instructor to discuss the possibility of an extension.

Grade Disputes

It is extremely important that you pay attention to your grades on a regular basis. If you feel that an assignment has been graded incorrectly or unfairly, you must speak with your instructor within **one week** of getting your grade on that assignment. We will not re-grade assignments at the end of the semester or offer any extra credit if you are not satisfied at that time with your final course grade, especially since you will have known all semester what is expected of you to earn your desired grade in this course.

We believe strongly that grades are earned, not given. If you need to achieve a certain grade in this course, be careful to complete all assignments, plan appropriate time for studying, come to office hours/tutor room and ask questions, review feedback you receive on graded activities so you can talk to us about any problems you missed, and get help as needed in order to achieve your goal. We hope your grade in the course will be just as important to you on Day 1 as it is at the end of the semester, especially since you will have known the expectations of this course all semester and are in control of deciding what grade to earn. We do not bump grades at the end of the semester, we do not have extra credit and we cannot change grades based on a person's circumstances. Do not expect your exams to be curved; they may or may not depending on how the class does. We do not curve the final total points at the end.

IMPORTANT! Keep track of your grades!!

Grading scale

93–100: A

90–92.9: A-

87–89.9: B+

83–86.9: B

80–82.9: B-

77–79.9: C+

73–76.9: C

70–72.9: C-

67–69.9: D+

60–66.9: D

Below 60: E

Health and safety

The safe and healthy Buckeyes site is a good one to bookmark (<https://safeandhealthy.osu.edu/>). It is regularly updated with the latest advice from the university.

- **Masks are optional** in most settings on all Ohio State campuses, including general-purpose buildings, residence halls, dining facilities, classrooms, offices, the Ohio Union, and on public transportation. Masks are also optional outdoors. (Read guidance for individuals for specific circumstances)

Faculty feedback and response time

I am providing the following to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** if you have a technical problem.)

Grading and feedback

For large weekly assignments, you can generally expect feedback within **7 days**.

E-mail

Email messages sent to your lecture instructor will be responded to within 48 hours on weekdays. Specific technical questions about the course material that require significant back-and-forth communication are not well suited for e-mail; while we will do our best to answer such questions, we may ask that you attend office hours if your question isn't easily answerable over email.

In order to protect your privacy, all course email correspondence must be done through a valid OSU name.number or Buckeyemail account, or through the course website(Carmen Canvas). If you send an email message and get no reply within 48 hours, please send that message again.

Attendance, participation, and discussions

Student participation requirements

The following is a summary of everyone's expected participation:

- **Attending in-person class meetings: THREE TIMES PER WEEK**
Students are expected to attend and participate in the in-person class meetings.
- **Logging in: AT LEAST ONCE PER WEEK**
Be sure you are logging in to the course in Carmen each week, including weeks with holidays. You will need to log in to Carmen to complete quizzes, view lecture content and upload homework assignments. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible*.
- **Office hours:**
You are encouraged to attend office hours for assistance. If you need to speak with me

privately about a topic that cannot be easily discussed during office hours, please contact me to schedule a time to meet.

Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. Informality (including an occasional emoticon) is fine for non-academic topics.
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.
- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. (For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.)
- **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

Other course policies

Student academic services

Student academic services offered on the OSU main campus

<http://advising.osu.edu/welcome.shtml>.

Student support services

Student support services offered on the OSU main campus <http://ssc.osu.edu>.

Academic integrity policy

Policies for this course

- **Exams:** You must complete the midterm and final exams yourself, without any external help or communication.
- **Written assignments:** Your written assignments, should be your own original work. In formal assignments, you should cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in, but no one else should revise or rewrite your work.
- **Reusing past work:** In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build

on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.

- **Collaboration and informal peer-review:** The course includes many opportunities for formal collaboration with your classmates. While study groups and peer-review of major written projects is encouraged, remember that comparing answers on a quiz or assignment is not permitted. If you're unsure about a particular situation, please feel free to ask the instructor.

Ohio State's academic integrity policy

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/>.

Copyright disclaimer

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. **No course materials provided by the instructor (notes, videos, recordings, computer code, homework assignments, homework solutions, quizzes, exams, etc.) may be distributed publicly or privately to anyone outside of the class.**

Statement on title IX

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, Kellie Brennan, at titleix@osu.edu

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 isolating while waiting for a COVID-19 test result, please let me know immediately. Those testing positive for COVID-19 should refer to the Safe and Healthy Buckeyes site for resources. Beyond five days of the required COVID-19 isolation period, I may rely on Student Life Disability Services to establish further reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or slds.osu.edu.

Accessibility of course technology

This course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [Carmen \(Canvas\) accessibility](#)
- Streaming audio and video
- Synchronous course tools

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 through the 24/7 National Suicide Prevention Hotline at 1-800-273- TALK or at suicidepreventionlifeline.org

Religious Accommodations

Our 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. This alternative accommodation will remain confidential. It is the student's responsibility to ensure that all course assignments are completed.

For more information about religious accommodations at Ohio State, visit odi.osu.edu/religious-accommodations.

Weather or other short-term closing

Should in-person classes be canceled, I will notify you as to which alternative methods of teaching (Ex: meet virtually via CarmenZoom) will be offered to ensure continuity of instruction for this class. Communication will be via Announcements on CarmenCanvas.

Disclaimer

This syllabus should be taken as a fairly reliable guide for the course content. However, we reserve the right to change due dates or the methods of grading and/or assessment if necessary. Any changes will be communicated to you through official course announcements.

Course schedule (tentative)

The following tentative course schedule is subject to change.

Week	Topic	Textbook Reading
1	Sample spaces and events, axioms and properties of probability, counting techniques, conditional probability	1.1-1.4, 2.1-2.4
2	Bayes' theorem and independence, discrete random variables, probability distributions, expectation and variance of (functions of) random variables	2.5, 3.1-3.3
3	Binomial, Poisson probability distributions	3.4, 3.6
4	Continuous random variables, density and distribution functions, percentiles and expected values, the Normal distribution	4.1-4.3
5	Exponential, Gamma distributions, joint probability distributions, conditional distributions, conditional expectation, covariance and correlation	4.4, 5.1-5.2
6	Sampling distribution of a statistic, distribution of the sample mean and central limit theorem	5.3-5.5
7	Populations and parameters, samples and statistics, concepts of estimation and inference	6.1
8	Point estimation, including method of moments and maximum likelihood	6.2
9	Confidence intervals, large sample intervals for means and proportions	7.1-7.2
10	Confidence intervals for means of normal populations, hypotheses and testing procedures	7.3, 8.1
11	Hypothesis testing, tests for population means and proportions	8.2-8.4
12	Simple linear regression	12.1-12.2
13	Simple linear regression, estimation and inference	12.3-12.4
14	Simple linear regression, model checking, transformations	13.1-13.2
15	Multiple regression, goodness of fit tests	13.4, 14.1

