STAT 3470.01 – INTRODUCTION TO PROBABILITY AND STATISTICS FOR ENGINEERS
M W F 08:00 AM-08:55 AM SP 2023

Course overview

Instructor

Instructor: Dr. Steephanson Anthonymuthu
Email address: anthonymuthu.1@osu.edu
Office: Cockins 321
Office hours (in-person): Mondays and Wednesdays 10:15 am - 11:15 am, or by appointment.
Office hours (online Zoom): Tuesday 09:30 am - 10:30 am.

Graders

Grader: Haotian Xie
Email address: xie.908@osu.edu

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 at 209 W 18th Ave 170from 8:00 AM - 8:55 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 are not required and will not be graded. However, students are expected to use these boards to ask any content questions rather than emailing the instructor. There will be a board dedicated to the material from each chapter, 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.
If you are unable to come to class for illness or other reason, the lectures may be recorded using the Zoom integration feature on Carmen. Click on the Zoom link on the left of the Carmen page and then click Cloud Recordings to access the recordings.

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. You are expected to bring a device to class (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

Grading and faculty response

Grades

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 work together to understand course concepts, but students must submit their own work to WebAssign. Students are also encouraged to seek help from the discussion boards and instructor office hours for these problems. Students are allowed to use outside materials 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

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 for each chapter in general. Students must submit solutions to these assignments online (in class or outside of the class), through the WebAssign interface and/or Carmen. Due dates will be posted on Carmen and Webassign. Students will have specific attempts (Ex: 2 attempts). There will be a time limit (Ex: one hour for a quiz). Students are allowed to use outside materials 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.
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.
For both homework and quizzes, no credit will be given for late submissions. If you need an extension due to emergency, illness, academic conflict, etc., please contact before the due date of the assignment.

Exams:
There will be two midterm exams and one final exam. Each exam contains both multiple choice and short answer questions. 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. The exams are closed book. For each midterm exam you will be permitted one sheet of 8.5" x 11" paper with formulas/notes/examples (both sides of the paper may be used, and you may type it if you wish). For the final exam you will be permitted two such sheets of paper. You will be given a packet of statistical tables for use during the exam. 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 normal class periods, make-up exams will not be given except in case of an emergency or due to conflicts with other university activities. If for some reason you are unable to make the exams, please contact me as soon as possible. Late requests may be denied or penalties may be assessed.
If you find a discrepancy in the grading of a midterm exam (e.g., incorrect addition/subtraction, correct answer marked incorrect, etc.) then you must bring it to my attention (either in person or through email) no later than one weeks from the day the exams are returned. After that grades will typically not be changed.

Midterm Exam 1:
Wednesday February 15, 2023 (In class)

Midterm Exam 2:
Wednesday March 29, 2023 (In class)

Final exam:
Thursday April 27, 2023, from 8:00 PM - 9:45PM in McPherson Lab 1000

Late assignments

Generally, late homework assignments are not accepted. Please plan your time so that you can complete assignments far enough in advance to avoid any last-minute problems uploading your completed work. If exceptional circumstances (sudden onset of illness, unexpected family situations, etc.) arise, contact the instructor to discuss the possibility of an extension.

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

I will reply to e-mails within **24 hours on school days**. Specific technical questions about the course material that require significant back-and-forth communication are not well suited for e-mail; while I will do my best to answer such questions, I may ask that you attend office hours if your question isn't easily answerable over email.

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**:
  Yor 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 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; http://slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

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

Disclaimer

This syllabus should be taken as a fairly reliable guide for the course content. However, you cannot claim any rights from it and in particular 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 andcorrelation**	**4.4, 5.1-5.2**
6	**Sampling distribution of a statistic, distribution of the sample mean andcentral 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 andtesting 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**