THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

STAT 3470.1: Introduction to Probability and Statistics for Engineers

Autumn 23

Instructor: Nasser Sadeghkhani
Email: sadeghkhani.1@osu.edu

Class:

- M W F 13:50-14:45 PM @UH0014

  Here is the Campus Map https://www.osu.edu/map/buildingindex.php

Office Hours: Thursday 11:30 am-12:30 pm or by appointment. My office is located at 205B Cockins Hall.

TAs:

- Zhizhen Zhao (zhao.3053)
- Biqing Yang (yang.5733)
- Yingyu Cheng (cheng.1753)

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 learning outcomes:

- General Education (GE) Requirement: This course satisfies the GE requirement in Data Analysis.
- Expected Learning Outcomes: Upon successful completion of this course, students understand basic concepts of statistics and probability, comprehend methods needed to analyze and critically evaluate statistical arguments, and recognize the importance of statistical ideas.

Course delivery:

- This three credit course will be delivered **in-person class** during the scheduled class meeting times.

- Students are expected to attend and participate in these **in-person class** meetings. **Please arrive on-time**. 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. **No recorded version** or **online streaming** of lectures are provided.

Main Reference:

- **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 the accompanying homework management system WebAssign are offered through CarmenBooks. https://affordablelearning.osu.edu/carmenbooks/students. Instructions for accessing this course's WebAssign page will be posted on CarmenCanvas. The course instructor and graders will have access to data collected by WebAssign, including all recorded homework solution attempts.

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

Course Requirements:

- Instructions, materials, assignments, announcements and other information will be posted to the course CarmenCanvas site. Students are encouraged to use the CarmenCanvas "discussion" boards.
- Students are expected to use the discussion board to ask any content questions (you are welcome to email me and the TAs, but using the boards is highly encouraged instead of emailing). Furthermore, 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.
- All the email regarding to content questions must be cc'ed to the TAs as well. The TAs will take care of most of them.
- Students are expected to check the CarmenCanvas course site regularly, and are encouraged to customize CarmanCanvas notifications to stay abreast of course announcements and activities https://resourcecenter.odee.osu.edu/carmencanvas/setting-notification-preferences)
- The lecture notes will be released one week in advance of every session on Carmen.
- Note that the lecture notes are partial, and you need to add some material during classes. So try not to miss classes!

Evaluation: The evaluation will be determined based on (approximately) **6** assignments, **two** midterm exams, and **one** final exam.

Assignments 25%, First Midterm 20%, Second Midterm 25%, Final 30%.

Grades will be recorded on Carmen

Important Dates:

Assignments	Almost biweekly (on Carmen)
Midterm #1	F–Sep 29 (in class)
Midterm #2	F–Nov 03 (in class)
Final Exam	W–Dec 13 2:00PM-3:45PM

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

Assignment Policy:

- There will be roughly weekly homework assignments via WebAssign. The assignments will be completed and submitted online, through the WebAssign interface.
- Pay attention to the due date, it is usually one week after the assignment is posted. No late assignment will be accepted. If you are unable to complete an assignment on time, please get in touch with me asap, so we can discuss your situation.
- You are encouraged to work together (esp., through the discussion board) on the homework, but **do not** copy any part of a assignment.

Exam Policy:

- All exams are closed book/closed notes.
- You can bring one page formula sheet.
- Each exam coverage will be notified prior to the exam.
- The exams will be cumulative, but will emphasize the more recent material. There will be **no make-up** exams. If exceptional circumstances (sudden onset of illness, unexpected family situations, etc.) arise, contact me asap, so we can discuss your situation.

Class Policy:

- **Arrive to class on time.**
- Be courteous when using mobile devices. Make sure your cell phone is turned fully off, or silent. No texting, reading emails, playing games, or whatever else it is that people do with those wretched gizmos.
- If you must use a laptop in class, then turn off the sound and do not type on laptop keyboards which is really distracting.
- Missing one class could easily lead to a disastrous domino effect. If you have to miss a lecture, then I strongly recommend you study the material you missed before you return to class. Do not hesitate to come by and ask me. I require that you know all material covered in class. You are responsible for making up anything that was covered in lectures you missed.

Health and safety:

The Ohio State University Wexner Medical Center's Cornavirus Outbreak site (https://wexnermedical.osu.edu/features/coronavirus) includes the latest information about COVID-19 as well as guidance for students, faculty and staff.

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.

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.

Accessibility accommodations for students with disabilities:

- The University strives to make all learning experiences as accessible as possible. 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; https://slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

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 at titleix@osu.edu.

Course topics/Schedule

Below are tentative topics to be covered. Note that they are tentative and may be subject to change.

1. **Week1:** Sample spaces and events, axioms and properties of probability, counting techniques, conditional probability. *textbook:* 1.1-1.4, 2.1-2.4
2. **Week2:** Bayes' theorem and independence, discrete random variables, probability distributions, expectation and variance of (functions of) random variables. *textbook:* 2.5, 3.1-3.3
3. **Week3:** Binomial, Poisson probability distributions. *textbook:* 3.4, 3.6
4. **Week4:** Continuous random variables, density and distribution functions, percentiles and expected values, the Normal distribution. *textbook:* 4.1-4.3
5. **Week5:** Exponential, Gamma distributions, joint probability distributions, conditional distributions, conditional expectation, covariance and correlation. *textbook:* 4.4, 5.1-5.2
6. **Week6:** Sampling distribution of a statistic, distribution of the sample mean and central limit theorem. *textbook:* 5.3-5.5
7. **Week7:** Populations and parameters, samples and statistics, concepts of estimation and inference. *textbook:* 6.1
8. **Week8:** Point estimation, including method of moments and maximum likelihood. *textbook:* 6.2
9. **Week9:** Confidence intervals, large sample intervals for means and proportions. *textbook:* 7.1-7.2
10. **Week10:** Confidence intervals for means of normal populations, hypotheses and testing procedures. *textbook:* 7.3, 8.1
11. **Week11:** Hypothesis testing, tests for population means and proportions. *textbook:* 8.2-8.4
12. **Week12:** Goodness of fit tests, simple linear regression. *textbook:* 14.1, 12.1
13. **Week13:** Simple linear regression, estimation and inference. *textbook:* 12.2-12.4
14. **Week14:** Simple linear regression, model checking, transformations. *textbook:* 13.1-13.2
15. **Week15:** Multiple regression. *textbook:* 13.4