

STATISTICS IN QUALITY Syllabus

[STAT 3440] [Autumn 2022]

Course Information

- **Course times and location:** Monday and Wednesday, 8:00am -9:20am in CarmenZoom plus Tuesday 10:00am- 11:15 am office hours
- **Credit hours:** 3
- **Mode of delivery:** Distance Learning (Synchronously in CarmenZoom)

Instructor

- **Name:** Omer Ozturk
- **Email:** Ozturk.4@osu.edu
- **Office location:** 350H Morrill Hall, Marion Campus
- **Office hours:** Tuesday 10:00 am.-11:15 am in CarmenZoom,
- **Preferred means of communication:**
 - My preferred method of communication for questions is **email**.
 - My class-wide communications will be sent through the Announcements tool in CarmenCanvas. Please check your [notification preferences](https://go.osu.edu/canvas-notifications) (go.osu.edu/canvas-notifications) to be sure you receive these messages.

Course Prerequisites

Math 1152, 1161.xx, 1172, 1154, 1155, or equiv., or permission of instructor. Not open to students with credit for 3450, 3460 and 3470.

Course Description

The course covers descriptive statistics, introduction to probability, Bayes theorem; discrete and continuous random variables, expected value, probability distributions; interval estimation for means and proportions; hypotheses tests for means and proportions; least squares regression; one- and two-way anova; control charts; Process capability indices.



THE OHIO STATE UNIVERSITY

[College of Arts & Sciences]
[Department of Statistics]

Course materials

Required textbook: Principles of Statistics for Engineers and Scientist, 5th Edition, by William Navidi.

Learning Outcomes

By the end of this course, students should successfully be able to:

- Select and construct appropriate display procedures to provide graphical summaries of the data.
- Use appropriate summary statistics to describe the distribution of data.
- Use appropriate statistical terminology to describe data and distributions.
- Use correct procedures for designing experiments and observational studies.
- Compute and interpret the probability of statistical events.
- Match common probability distributions with simple engineering data generating processes.
- Model engineering data based on large-sample normal distribution assumptions, and identify when such models are appropriate for given data,
- Use the Central Limit Theorem as the foundation of statistical inference.
- Construct and interpret confidence intervals within the context of engineering problems.
- Conduct and interpret hypothesis tests.
- Build a simple linear regression model and perform diagnostic checks for bivariate data.
- Construct one-way analysis of variance model and identify and interpret the source of variations.
- Select appropriate statistical tools to monitor process quality.
- Compute and interpret capability indices.



How This Online Course Works

Mode of delivery: The course will be 100% online and synchronously delivered using CarmenZoom during a scheduled class time that is common to all regional campuses. All lectures are delivered in-person from one of the regional campuses, and synchronously broadcast to students from other regional campuses using CarmenZoom.

The instructor will hold weekly office hours via CarmenZoom. The times are given above.

Students need to come to a regional campus examination center to take any exams in the course. The exam will be free for the OSU students registered for this course.

Pace of online activities: This course has 100% synchronous content. Students are expected to attend and participate in each lecture synchronously via CarmenZoom.

Credit hours and work expectations: This is a 3 credit-hour course. According to [Ohio State bylaws on instruction](https://go.osu.edu/credithours) (go.osu.edu/credithours), students should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of C average.

Attendance and participation requirements: Research shows regular participation is one of the highest predictors of success. With that in mind, I have the following expectations for everyone's participation:

- **Participating in online activities for attendance:** **Every lecture,** you are expected to log in to CarmenZoom to attend the class and participate in class discussion.
- **CarmenZoom meetings and office hours:** Office hours will be scheduled in CarmenZoom and will be optional. Students who are not able make the office hours may request CarmenZoom meeting with the instructor.

Course Technologies

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

If you do not have access to the technology you need to succeed in this class, review options for technology and internet access at go.osu.edu/student-tech-access.

Required Software

Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365. Visit the [installing Office 365](https://go.osu.edu/office365help) (go.osu.edu/office365help) help article for full instructions.

Minitab: This class requires statistical software package Minitab (<https://www.minitab.com/en-us/>). The software will be installed in all regional campuses computer labs and student will have remote access to software.

For personal computers, students have the option to purchase a six-month rental license costing \$32.99 directly from <https://www.minitab.com/en-us/academic/>

Note that Minitab software is available only for Windows PCs.

CarmenCanvas Access

You will need to use [BuckeyePass](https://buckeyepass.osu.edu) (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 do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the [BuckeyePass - Adding a Device](https://go.osu.edu/add-device) (go.osu.edu/add-device) help article for step-by-step instructions.
- 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.
- [Install the Duo Mobile application](https://go.osu.edu/install-duo) (go.osu.edu/install-duo) on 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 \(HELP\)](tel:614-688-4357) and IT support staff will work out a solution with you.

Technology Skills Needed for This Course

- Basic computer and web-browsing skills
- [Navigating CarmenCanvas](https://go.osu.edu/canvasstudent) (go.osu.edu/canvasstudent)
- [CarmenZoom virtual meetings](https://go.osu.edu/zoom-meetings) (go.osu.edu/zoom-meetings)
- [Recording a slide presentation with audio narration and recording, editing and uploading video](https://go.osu.edu/video-assignment-guide) (go.osu.edu/video-assignment-guide)

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat:** go.osu.edu/it
- **Phone:** [614-688-4357 \(HELP\)](tel:614-688-4357)
- **Email:** servicedesk@osu.edu



Grading and Faculty Response

Homework and exams

Assignment or category	Percentage
Homework	20
Labs+ Participation	10
Quizzes	15
Midterm	25
Final	30
Total	100

See [Course Schedule](#) for due dates.

Descriptions of Major Course Assignments

Homework: There are several homework assignments and lab reports which are due at various times during the semester. The homework will be assigned through course webpage in Carmen.

Put your name and the homework assignment number on the top right-hand corner of every page. Submit the problems in order, making sure that the computer output and discussion is placed together (do not put the computer output at the end of homework). Raw computer output is not acceptable. Make it clear what parts of the output are relevant and show how they answer the questions posed in the homework.

Quizzes: There will be three quizzes. The quizzes will be given during synchronous class session. Students will turn on their video camera while taking the quizzes and will be observed by the instructor. The tentative dates of quizzes are listed in the course schedule.

Exams: There will be one midterm and a two-hour final exam. The final exam will be comprehensive with a slight emphasis on those topics covered later in the semester. Tentative dates of exams are listed in the course schedule. To preserve the academic integrity, the exams will be given in examination centers in regional campuses.

Proctoring is offered in examination centers in the following regional campuses:

Ohio State Lima: Proctoring is offered through [The Learning Center](#) and is free for any student taking a course at Ohio State. You must work with your instructor to schedule your exams. Instructors can begin the process by [contacting the Testing Services](#)

Ohio State Mansfield: Proctoring is offered through the [Conard Learning Center](#). You must work with your instructor to schedule your exams. Instructors can begin the process by [contacting Andrew Mueller to learn more](#)

Ohio State Marion: Proctoring is offered through the [Marion Technical College Student Resource Center](#) and is free for any student taking a course at Ohio State. You must work with your instructor to schedule your exams.

Ohio State Newark: Proctoring is offered through the [Newark Testing Center](#) and is free for any student taking a course at Ohio State. You must work with your instructor to schedule your exams. Instructors can begin the process by contacting the [Testing Center to request an appointment and necessary documentation](#)

Class Participation: The participation in lectures and labs are required. The class participation will be assessed based on attendance in the lectures and contribution to class discussions. Based on the content of the labs, the lab sessions will involve either data analysis, practice exercise problems or both. Each student is expected to write a report for each lab session. These reports will be graded as a part of the student's final grade in the course.

Full credit policy: Full credit for exam problem can only be earned through showing your justification for or work on each problem. Answers without work will **not** receive full credit.

Late Assignments: No make-up exams will be given unless you have made arrangement with the instructor *prior to* the beginning of the exam. No late homework is accepted unless you have a reasonably reason.

Academic integrity and collaboration: You are encouraged to work together on the homework, but do not copy any part of somebody else's homework. Your written assignments, including discussion posts, should be your own original work.

Faculty feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course. Remember that you can call [614-688-4357 \(HELP\)](tel:614-688-4357) at any time if you have a technical problem.

- **Preferred contact method:** If you have a question, please contact me first through my Ohio State email address. I will reply to emails within **24 hours on days when class is in session at the university**.
- **Class announcements:** I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check [your notification preferences](https://go.osu.edu/canvas-notifications) (go.osu.edu/canvas-notifications) to ensure you receive these messages.
- **Grading and feedback:** For weekly assignments, you can expect feedback within **7-10 days**.
- **E-mail:** I will reply to e-mail within 24 hours on school days

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



Other Course Policies

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.

- **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. I will provide specific guidance for discussions on controversial or personal topics.
- **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.
- **Synchronous sessions:** During our CarmenZoom sessions I ask you to use your real name and a clear photo of your face in your Carmen profile. During our full-group lecture time, you may turn your camera off if you choose. When in breakout rooms or other small-group discussions, having cameras and mics on as often as possible will help you get the most out of activities. You are always welcome to use the [free, Ohio State-themed virtual backgrounds](https://go.osu.edu/zoom-backgrounds) (go.osu.edu/zoom-backgrounds). Remember that CarmenZoom and the CarmenZoom chat are our classroom space where respectful interactions are expected.

Academic Integrity Policy

See [Descriptions of Major Course Assignments](#) for specific guidelines about collaboration and academic integrity in the context of this online class.

Ohio State's Academic Integrity Policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the university's [Code of Student Conduct](https://studentconduct.osu.edu) (studentconduct.osu.edu), and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the university's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the



university's *Code of Student Conduct* is never considered an excuse for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

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](http://go.osu.edu/coam) (go.osu.edu/coam)
- [Ten Suggestions for Preserving Academic Integrity](http://go.osu.edu/ten-suggestions) (go.osu.edu/ten-suggestions)
- [Eight Cardinal Rules of Academic Integrity](http://go.osu.edu/cardinal-rules) (go.osu.edu/cardinal-rules)

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 Office of Institutional Equity:



1. Online reporting form at equity.osu.edu,
2. Call 614-247-5838 or TTY 614-688-8605,
3. 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 Office of Institutional Equity 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.

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. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, [on-demand mental health resources](https://go.osu.edu/ccsondemand) (go.osu.edu/ccsondemand) are available. You can reach an on-call counselor when CCS is closed at [614- 292-5766](tel:6142925766). **24-hour emergency help** is available through the [National Suicide Prevention Lifeline website](https://suicidepreventionlifeline.org) (suicidepreventionlifeline.org) or by calling [1-800-273-8255\(TALK\)](tel:18002738255). [The Ohio State Wellness app](https://go.osu.edu/wellnessapp) (go.osu.edu/wellnessapp) is also a great resource.



Accessibility Accommodations for Students with Disabilities

Requesting Accommodations

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 \(SLDS\)](#). After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. 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. Disability Services contact information for each regional campus is given below.

Disability Services Contact Information

Newark:

Any student who needs accommodations due to any type of disability, must first register with Student Life Disability Services (SL-DS). Please call Student Life at 740-364-9578 or stop by Warner Center 226 to discuss procedures for getting accommodations. After accommodations are authorized, you will receive an Access Letter to share with your professors to help with the conversation of your needs. You do not need to disclose your disability to faculty.

Although accommodations may be authorized any time in a term, it is to your best interest to disclose your needs during the first week of class.

Lima:

The contact information for Ohio State Lima Disability Services follows: Karen Meyer, M.S.Ed, Coordinator for Disability Services, The Ohio State University at Lima, Student Services Building, 567-242-7194 Office / 567-242-7506 Fax; meyer.193@osu.edu.

Mansfield:

To establish reasonable accommodations, I may request that you register with Student Life Disability Services on the Mansfield Campus. After registration, make arrangements with the Student Life Disability Services as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact



information: mcgregor.40@osu.edu; 419-755-4304; insert office number Ovalwood Hall.

Marion:

The university strives to make all learning experiences accessible to all students. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let Julie Prince know immediately so that we can privately discuss options. To establish reasonable accommodations, register with the Office for Disability Services at <https://sierra.accessiblelearning.com/OSU/ApplicationStudent.aspx>. After registration, make arrangements with Julie Prince as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. ODS contact information: marionds@osu.edu; 740-7256247; <https://osumarion.osu.edu/academics/academic-support-services/disability-services.html>; 128 Maynard Hall, 1461 Mount Vernon Avenue, Marion.

Accessibility of Course Technology

This online course requires use of CarmenCanvas (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 as early as possible.

- [CarmenCanvas accessibility](https://go.osu.edu/canvas-accessibility) (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- [CarmenZoom accessibility](https://go.osu.edu/zoom-accessibility) (go.osu.edu/zoom-accessibility)



Course Schedule

Week	Date	Topics	Assignment
1	Aug 24	Overview of the course and brief review of the syllabus, observational studies, experiment, simple random sample, Histogram and box plot, shape of the data, location measure, mean, median and mode	Assignment 1, Due date is at the end of the third week
2	Aug 29	Measures of spread, standard deviation, IQR, empirical rule, outliers.	
2	Aug 31	Lab1, exploratory data analysis.	Lab1 report, descriptive statistics
3	Sep 5	No classes, Labor Day	
3	Sep 7	Basic set operation, union, intersection, complement events. Probability axioms and rules	Assignment 2, Due date is at the end of the 5th week.
4	Sep 12	Conditional probabilities, Bayes theorem, independent events	
4	Sep 14	Discrete random variable, probability mass function, Expected Value, Standard Deviation	
5	Sep 19	Binomial Distribution	Assignment 3, Due date is at the end of the 6th week
5	Sep 21	Poisson Distribution, Lab2, acceptance sampling design	Lab2 report, acceptance sampling
6	Sep 26	Normal distribution	Quiz 1
6	Sep 28	Exponential distribution, review for midterm	
7	Oct 3	Midterm exam	
7	Oct 5	Central limit theorem, sampling distribution of mean and proportion	Assignment 4, Due date is at the end of 9 th week, Lab3 report
8	Oct 10	Lab3, normal distribution	
8	Oct 12	Confidence interval for mean	
9	Oct 17	Confidence interval for proportion	
9	Oct 19	Hypothesis testing for mean	Assignment 5, Due date is at the end of the 11 th week
10	Oct 24	Hypotheses testing for proportion.	
10	Oct 26	Two-sample problem for mean	Quiz 2
11	Oct 31	Two-sample problem for proportion Lab 4, Two sample inference	Lab4 report, Two-sample inference
11	Nov 2	Comparing observational studies and experiment, basic principles of a design of experiment.	Assignment 6, Due date is at the end of the 12 th week
12	Nov 7	Anova, Lab5	Lab 5 report, design of experiment, Anova
12	Nov 9	Correlation	Homework 7, due date is at the end of the 14 th week
13	Nov 14	Simple linear regression model	
13	Nov16	Control charts	Homework 8, Due date is at the end of the 16 th week
14	Nov 21	Control charts	
14	Nov 23	Process capability indices, Cp	
15	Nov 28	No classes, Thanksgiving break	
15	Nov 30	Process capability indices, Cpk	Quiz 3
16	Dec 5	Lab 6, Process capability indices, Cpk, Review for final	Lab 6 report
16	Dec 7	Review	

