



THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

WELCOME TO: STAT 2450 AUTUMN 2023

INTRODUCTION TO STATISTICAL ANALYSIS I

Course overview

Instructor & Office Hours

Instructor: Dr.Sanjeewani Weerasingha

Email address: weerasingha.1@osu.edu

Office Hours(in-person): Monday, Wednesday and Friday 11:15 AM – 11:45 AM, or by appointment.

Office Location: Cockins 205C

Office Hours (online Zoom): Tuesday and Thursday 9:00 AM – 10:00 AM

Class Meetings Days/Times

Class will meet Monday and Wednesday 1:50 PM – 2:45 PM in Hitchcock Hall 131.

There are recitations on Friday in EA building (EA265, EA275 or EA285).

You must attend the recitation section for which you are registered.

Teaching Assistant

Teaching Assistant Name - Email address

Torey Hilbert hilbert.54@osu.edu

Sang Wan Lee lee.10007@osu.edu

Yumo Peng peng.704@osu.edu

Zoom Office Hours: by appointment.

Course Description

Calculus-based introduction to statistical data analysis includes sampling, experimental design, probability, binomial and normal distributions, sampling distributions, inference, regression, ANOVA, two-way tables. The prerequisite for this course is differential calculus.

Your Support System

Lecturer	Provide the overarching view of the clusters of concepts.
Recitations	Reinforce and extend content covered in lecture. Students should expect to be active participants in these sessions.
Office Hours	Conducted in in-person and one large Zoom room, but you can email me if you need to speak with me privately.

Primary Course Goal:

- To develop skills in drawing conclusions & critically evaluating results based on data.

Course Objectives:

- To enable you to use statistical tools for presentation and descriptions of data
- To enable you to correctly apply probability rules and counting techniques.
- To enable you to understand the use of sampling distributions as the foundation of inference.
- To enable you to analyze data through linear regression, confidence intervals, and hypothesis tests.

Course learning outcomes

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

- Understand basic concepts of statistics and probability.
- Comprehend methods needed to analyze and critically evaluate statistical arguments.
- Recognize the importance of statistical ideas.

GE Course Information

This course satisfies the Legacy General Education requirement in Data Analysis. The goal of the course is to help students develop skills in drawing conclusions and critically evaluating results based on data. Upon successful completion of this course students will be able to:

- Students understand basic concepts of statistics and probability.
- Students comprehend methods needed to analyze and critically evaluate statistical arguments.
- Students recognize the importance of statistical ideas.

Course materials

Required Course Materials

- *Introductory Statistics: A Problem-Solving Approach (3rd ed.)* Kokoska.
ISBN: 9781319272685

This course requires electronic access to the accompanying web-based materials via Achieve. The ebook, quizzes, and homework assignments are all located within this resource.

The textbook and courseware for this course is being provided via CarmenBooks. The fee for this material is included as part of tuition and is listed as CarmenBooks fee on your Statement of Account. In addition to cost-savings, materials provided through CarmenBooks are available immediately on or before the first day of class.

Unless you choose to opt-out of the program, you do not need to purchase any materials for this course at the bookstore. For more information on the program or information on how to opt out, please visit the [CarmenBooks website](#).

CarmenBooks will include an e-book of the textbook along with access to Achieve (our online quiz and homework management system). In addition to the e-book, if you would like a hard copy of the textbook, please visit the OSU Bookstore: <https://tinyurl.com/Wa-STAT-145002-32810>

Access to the courseware for this title through the **Macmillan Higher Education Learning** tab is on the left-side of the course navigation.

Student Registration Instructions

- Log into STAT 2450 through Carmen.
- Click the “MacMillan Higher Education” in the left navigation panel.
- Click the Achieve link (note: if you encounter an error message or blank screen, you will need to adjust your browser settings and/or disable pop-up blockers).
- Agree to Macmillan Learning terms of use and end user agreement.
- Click on any Achieve assignment link to launch the assignment. Follow the associated steps and continue to your assignment page.
- You are now enrolled in the course and can access future assignments through the Carmen links.
- To access your e-book, select the down arrow next to your name in the upper right corner.
- **Need Help?** The publisher’s technical support team can be reached by phone, chat, or by email via the Student Support Community. To contact support please open a service request by filling out the webform:
<https://macmillan.force.com/macmillanlearning/s/contactsupport>.

Required Supplemental Materials

JMP is the statistical software for this course. JMP software is free for OSU students. Instructions for download are available at <https://ocio.osu.edu/software/software-request-istructions>
Please read the download instructions carefully as the program will not be usable without the associated license.

Optional Materials

- Texas Instruments 83 Plus (or higher) Graphing Calculator.
- University provided iPad.

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

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.

Technology Skills Needed for This Course

- Basic computer and web-browsing skills.
- If you need technical assistance, either call 614-688-HELP, or refer to the online instructions: <https://resourcecenter.odee.osu.edu/carmenzoom>
- Use of Achieve, which you must purchase (see above). If you need technical assistance, either call tech support at 1-800-936-6899 or fill out the form located at <https://macmillan.force.com/macmillanlearning/s/contactsupport>

Required Equipment

- **Computer:** current Mac (MacOS) or PC (Windows 10) with high-speed internet connection
- **Other:** a mobile device (smartphone or tablet) to use for BuckeyePass authentication

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

Grading

Assignment or category	Percentage
Attendance & Participation-Recitation Activities	15%
Homework Assignments	20%
Quizzes	10%
Mid-term: Exam 1	15%
Mid-term: Exam 2	15%
Final Exam	25%
Total	100

Assignments Information

Recitation Assignment and Recitation Attendance

Assignments:

These are activities that we hope you will be able to work through each week, with your peers and your assigned teaching assistant, during recitation. **We don't expect you to complete lab activities during recitation, but we will always allow time during recitation for you to get started on lab activities, talk through the activities with your peers, and get immediate assistance from your teaching assistant. You will then submit your final work through CarmenCanvas on the following Monday, by 11:59pm.**

The recitations will be graded out of 10 points based on both completion and accuracy. At the end of the semester, the two lowest recitation grades will be dropped. Late work is not accepted unless there are extenuating long-term circumstances that are documented. The lowest 2 assignments are dropped to cover all work that is not turned in for any other reason. Submitting the wrong document - such as the blank assignment template, an incomplete version, or a corrupted version of the file - is not a valid excuse. It is your responsibility to ensure you have submitted the correct document in the correct format to the correct Carmen submission location.

Recitation questions will include short answer work. Make sure you bring completely filled-in lecture notes before recitation. We do not have time to explain material from scratch and will not be able to do so in recitation.

Attendance:

Attendance and Participation are REQUIRED in recitation and is worth 5 percent of your final grade. Coming late or not participating causes you to miss the point for the day. We do drop 2 attendance grades, but we DO NOT make up missed recitations, nor do we excuse them. Save your drops for when you absolutely need them.

Homework Assignments

There are 7 homework assignments that you will complete during the semester, with your lowest homework assignment grade being automatically dropped from your final course grade at the end of the semester.

The instruction to do the homework problems(Ex: number of attempt for each question) will be given with each assignment.

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.

Each homework assignment is worth 20 points. Links to homework assignments can be found within the weekly modules or by going to the **Assignments** link on the left side of the CarmenCanvas course page. You may use any materials you want to complete the homework. We encourage you to work on your own to get the most learning possible.

Quiz Assignments

There are 7 Quiz assignments that you will complete during the semester, with your lowest Quiz assignment grade being automatically dropped from your final course grade at the end of the semester. Each Quiz assignment is worth 10 points. Links to Quiz assignments can be found within the weekly modules or by going to the **Quizzes** link on the left side of the CarmenCanvas course page. You may use any materials you want to complete the Quizzes.

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.

Exam Information and Policies

There will be two midterm exams and one final exam. Exams are in person on paper. No extra materials are to be used on the exam. Exam questions contain multiple choice questions and may contain short answer questions. An online practice exam will be posted for each exam. You **MUST HAVE** your Buck-ID available to show the proctor during the exam. 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.

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.

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 assignments (Homework and Quizzes) 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. Submitting the wrong document - such as the blank assignment template, an incomplete version, or a corrupted version of the file - is not a valid excuse. It is your responsibility to ensure you have submitted the correct document in the correct format to the correct Carmen submission location. Please keep in mind that we drop your 2 lowest recitation activities grade **AND** your lowest homework assignment grade automatically at the end of the semester. Thus, the first time you miss a recitation assignment or a homework assignment, please don't worry about making up this work because we will consider those missed assignments to be your lowest grades.

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 assigned teaching assistant (i.e., your recitation instructor) or Dr. Weerasingha, 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

Instructor feedback and response time

Grading and feedback

For recitation assignments you can generally expect feedback within **10 days**. For exams, you can expect feedback within 14 days, but we will try to get feedback to you as soon as possible.

Note that:

- Questions about recitations grading should be directed to a assigned teaching assistant first. Exam, Homework, and quizzes grading questions should be directed to Dr. Weerasingha.
- If you find a discrepancy in the grades of recitation, homework, quiz, and midterm exam, then you must bring it to teaching assistant or Dr. Weerasingha attention no later than one week from the day the scores are in Carmen. After that grades will typically not be changed.

E-mail

Email messages sent to your lecture instructor, your assigned teaching assistant should 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

We expect you to be actively engaged in the learning process. You are responsible for your learning. Successful students perform a variety of positive academic behaviors like reviewing the Carmen page, downloading notes, being proactive in contacting a TA or classmate as necessary, etc. Schedule a minimum of 6 hours to prepare for this course. This equates to 9 hours weekly when the 3 hours for lecture and recitation attendance are included. Please seek assistance in managing any non-academic responsibilities prior to any potential for under-performance. Please also take advantage of optional opportunities to meet with me and/or the TAs during office hours. We're here to help!

Electronic Devices

As a courtesy to fellow classmates, all cellular phones and other electronic devices must be silenced during lectures and recitations.

Discussion and communication guidelines

Above all, please remember to be respectful and thoughtful in your communications in class and electronically. Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably.

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. A more conversational tone 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. 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.

Academic integrity policy

A guiding principle is that, if you are considering doing something that might be unethical, then “**Don’t do it!!**” This mantra applies to both academic and non-academic settings.

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/>.

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. <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. In short, if you are considering doing something that might be unethical, then resist and refrain from pursuing it. This will help you in college and well-beyond.

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:

- The Committee on Academic Misconduct web pages ([COAM Home](#))
- Ten Suggestions for Preserving Academic Integrity ([Ten Suggestions](#))
- Eight Cardinal Rules of Academic Integrity (www.northwestern.edu/uacc/8cards.htm)

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://www.nationalsuicideline.org/) ([suicidepreventionlifeline.org](https://www.nationalsuicideline.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 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.

Disability Services Contact Information

Phone: 614-292-3307 Website: slds.osu.edu Email: slds@osu.edu

In person: [Baker Hall 098, 113 W. 12th Avenue](#)

Accessibility of Course Technology

This course requires use of CarmenCanvas (Ohio State's learning management system) and other multimedia tools. If you need additional services to use these technologies, please request accommodations as early as possible.

- [CarmenCanvas accessibility](http://go.osu.edu/canvas-accessibility) (go.osu.edu/canvas-accessibility)

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

The following tentative course schedule is subject to change.

Mondays	Wednesdays
August 21 No Lecture	August 23 Chp.1 An Intro. To Statistics & Statistical Inference
August 28 2.1-2.3 Types of Data, Bar Charts, Pie Charts, Stem-and-Leaf Plots	August 30 2.4 Frequency Distributions and Histograms
September 04 No Lecture – Labor Day	September 06 3.1, 3.2 Measures of Central Tendency & Variability
September 11 3.3 Empirical Rule, Measures of Position, Box Plots Homework 1 Due	September 13 4.1 Experiments, Sample Spaces, Events Quiz 1 Due
September 18 4.2 An Introduction to Probability 4.3 Counting Techniques Homework 2 Due	September 20 4.4 Conditional Probability 4.5 Independence Quiz 2 Due
September 25 5.4 The Binomial Distribution (with ref. to 5.1)	September 27 6.2 The Normal Distribution (with ref. to 6.1) Quiz 3 Due
October 02 6.3 Checking the Normality Assumption 6.4 Exponential Distribution Homework 3 Due	October 04 Exam 1 (Chps. 1 – 4)
October 09 7.1 Statistics, Parameters & Sampling Distributions 7.2 Sampling Distribution of the Sample Mean	October 11 7.3 Distribution of the Sample Proportion Quiz 4 Due
October 16 8.1 Point Estimation Homework 4 Due	October 18 8.2 Conf. Int. for a Pop. Mean when σ is Known (z)
October 23 8.3 Conf.Int.for a Pop.Mean when σ is Unknown (t)	October 25 8.4 Confidence Interval for a Population Proportion Quiz 5 Due
October 30 9.1, 9.2 Parts of a Hypothesis Tests & Errors Homework 5 Due	November 01 9.3 Hypothesis Tests for a Pop. Mean when σ is Known(z)
November 06 9.4 P-Values	November 08 9.5 Hypothesis for Pop. Mean w/ σ Unknown(t) Quiz 6 Due
November 13 9.6 Hypothesis Tests for a Population Proportion Homework 6 Due	November 15 Exam 2 (Chps. 5 – 9.5)
November 20 11.1 One-Way ANOVA	November 22 No Lecture – Thanksgiving Break
November 27 12.1 Simple Linear Regression	November 29 12.2 Hypothesis Tests and Correlation Quiz 7 Due
December 04 13.1 Univariate Categorical Data Homework 7 Due	December 06 13.2 Bivariate Categorical Data
	December 13 Final Exam 2:00 pm – 3:45 pm