



THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

# **SYLLABUS: STAT 3410**

## **PRINCIPLES OF DATA COLLECTION AND ANALYSIS**

### **AUTUMN 2024**

## **Course overview**

### **Instructor**

Instructor: Dr. Kate Hu, Assistant Professor in the Department of Statistics

Office: Cockins Hall 205D

Email address: hu.3125@osu.edu

Office hours:

- Fridays 4-5 p.m.
- Wednesdays 4-5 p.m.

### **Course**

Lectures: Mondays, Wednesdays, Fridays 3:00 p.m. - 3:55 p.m. Pomerene Hall 150

### **Grader**

Ziyu Gao (gao.2043@buckeyemail.osu.edu)

MSLC office hours for tutoring:

Thursday 16:10pm-17:05pm CH 122

Monday: 10:20am-11:15am via zoom, zoom link in Carmen

## Course description

This course covers principles of data collection and data analysis. The course introduces students to the primary ideas involved in designed vs. observational studies, and considers appropriate statistical methods for each. It also covers the basic principles of experimental design and the techniques used to analyze experiments that follow standard experimental designs. Specific designs to be covered include one-way ANOVA, two-and-higher-way ANOVA, factorial designs, block designs, and models with random effects. Software R and JMP will be used in the course to carry out all analyses and to provide experience to students in data analysis.

## Course learning outcomes

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

- Grasp the basics of descriptive and inferential statistics for designed experiments and observational studies
- Understand principles of good design, such as randomization, replication, and blocking
- Recognize the importance of the assumptions that statistical models are based on
- Understand and use appropriate statistical notation and terminology
- Understand the fundamental components of ANOVA models (e.g., main effects and interactions)
- Effectively implement statistical analyses for designed experiments in statistical software
- Summarize an analysis appropriately

## Course materials

### Required

Design and Analysis of Experiments, 10th edition, by Douglas C. Montgomery, Wiley, 2020 (print)

## Course schedule (tentative)

Week	Topics, Readings, Assignments, Deadlines
1	Orientation; Course introduction; Introduction to Software
2	Experiments vs observational studies; Sampling Theory; Hypothesis Testing
3-7	The Analysis of Variance; Block Design
Oct, 4	Midterm 1

Week	Topics, Readings, Assignments, Deadlines
8-10	Factorial Designs and Other Designs
11-12	Regression and Random Effect Models
Nov, 15	Midterm 2
13-14	Additional topics and Observational Studies

## 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](mailto:8help@osu.edu)
- **TDD:** 614-688-8743

## Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Carmen

## Technology skills necessary for this specific course

- Carmen
- Scanning and uploading a written document to Carmen

## Necessary software

- We will be using 1) the JMP statistical computing software, which is available free of charge to students (see <https://ocio.osu.edu/software/software-request-instructions>) and 2) R (see <https://posit.co/download/rstudio-desktop/>).
- **Microsoft Office 365 ProPlus** All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Each student can install Office on five PCs or Macs, five tablets (Windows, iPad® and Android™) and five phones.
  - Students are able to access Word, Excel, PowerPoint, Outlook and other programs, depending on platform. Users will also receive 1 TB of OneDrive for Business storage.
  - Office 365 is installed within your BuckeyeMail account. Full instructions for downloading and installation can be found <https://ocio.osu.edu/kb04733>.

## Optional software

- Python: <https://www.python.org/>
- Jupyter notebook: <https://jupyter.org/>
- JupyterLab: <https://jupyter.org/>
- Google Colab: <https://colab.research.google.com/>

## Grading and faculty response

### Grades

Assignment or category	Percentage
Homework	20
In-class presentation	20
Midterm exams 1 and 2	30
Final group project	30
<b>Total</b>	<b>100</b>

*Only one of the two exams will be counted toward the final grade. You can choose which one to drop.*

### 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 information

Homework will be assigned approximately biweekly. It will consist of mostly textbook-style problems, problems motivated by real-world applications, and analyses requiring the use of statistical software. You may work together on assignment problems, but each student must hand in his or her own work, written in his or her own words. Do not copy any part of another student's homework including computer code or output. Use of homework solutions distributed in previous offerings of the course or available on the web constitutes academic misconduct and will be handled according to university rules. Sharing or disseminating solutions, or in any way knowingly enabling others to commit academic misconduct also constitutes academic misconduct and will be reported. Homework must be uploaded to Carmen at the end of the due date (ET). The solutions may be handwritten and scanned, entered directly into a tablet, or typed. Any software output must be included in the homework file prior to submission. **All work and software output must be uploaded as a single pdf file.** Please be sure that the questions are clearly labeled, all supporting work (including software output) can be easily identified, and that all figures/tables are referenced and interpreted in the text.

The use of generative artificial intelligence (AI) tools is permitted for assignments with proper attribution. Whenever you use AI tools, you should list the prompts used and indicate clearly your own contribution to the solution. Only three prompts are allowed. Microsoft copilot with data corporate data protection is now available to students (<https://it.osu.edu/news/2024/02/08/copilot-corporate-data-protection-now-open-students>).

## Late assignments

Late assignments will be accepted with a 25-point deduction when it is submitted before the beginning of class one day after the due date. No assignments will be accepted afterward.

## Faculty feedback and response time

### Grading and feedback

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

### E-mail

I prefer using the Carmen email tool. **Please write "STAT 3410" in the subject line if you communicate via email (hu.3125@osu.edu).** Due to the large volume of emails, I will reply to e-mails within **72 hours on school days**.

### Discussion board

I encourage you to post technical questions on the discussion board and answer them if you know the solution. Extra credit will be awarded toward the final grade to students who actively help answering statistical questions. Our teaching assistant and I will check and reply to messages as well. Call **614-688-HELP** at any time for IT help and support

# Attendance, participation, and discussions

## Discussion and communication guidelines

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.
- **Citing your sources:** When we have academic discussions, please cite your sources to back up your claim. (For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.)

## Other course policies

### Health and safety

The Ohio State University Wexner Medical Center's Coronavirus Outbreak site (<https://wexnermedical.osu.edu/features/coronavirus>) and Safe and Healthy Buckeyes site (<https://safeandhealthy.osu.edu/respiratory-virus-guidance>) 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>.

### Academic integrity policy

- **Exams:** You must complete the midterm exams yourself, without any external help or communication. No phones and computers are allowed unless specified.
- **Written assignments:** Your written assignments, including discussion posts, should be your own original work. In formal assignments, you should follow APA style to 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.
- **Falsifying research or results:** All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your library research look more successful than it was.
- **Collaboration and informal peer-review:** The course includes many opportunities for formal collaboration with your classmates. While study groups are allowed, remember that comparing answers on a quiz or assignment is not permitted. If you're unsure about a particular situation, please feel free just to ask ahead of time.

## 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 3335-5-48.7 (B)**). For additional information, see the **Code of Student Conduct**. <https://oaa.osu.edu/academic-integrity-and-misconduct>

## 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](mailto: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 ill and need to miss class, including if you are staying home and away from others while experiencing symptoms of a viral infection or fever, please let me know immediately. In cases where illness interacts with an underlying medical condition, please consult with Student Life Disability Services to request reasonable accommodations. You can connect with them at [slds@osu.edu](mailto:slds@osu.edu); 614-292-3307; or [slds.osu.edu](http://slds.osu.edu).**

## **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](http://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 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

## **Religious Accommodations**

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential. With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a



student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity. (Policy: Religious Holidays, Holy Days and Observances)

## **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. Content is subject to change.

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.