



THE OHIO STATE UNIVERSITY

STAT 3410

# **Principles of Data Collection and Analysis (24811)**

**Autumn 2026**

## **Syllabus - Instructor Information**

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Kate Hu

Professional Qualifications

Assistant Professor, Department of Statistics, The Ohio State University

Ph.D. Department of Biostatistics, University of Washington, Seattle,

M.S. Department of Biostatistics, Harvard University, 2008

B.S. Department of Biochemistry (First Class Honors), University of Hong Kong, 2006

## **Syllabus - Required or Recommended Readings**

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Montgomery, Douglas C. (2020). Design and Analysis of Experiments (10th edition). Wiley. ISBN: 978-1-119-49249-8. (No credits will be given to homework done based on previous versions.)

## Syllabus - Course Schedule

| Time Period  | Course Topic Outline (Tentative)                                          |
|--------------|---------------------------------------------------------------------------|
| Week 1       | Course Orientation, Experiments vs. Observational Studies                 |
| Week 2       | Hypothesis Testing Overview                                               |
| Week 3       | Introduction to Analysis of Variance (ANOVA)<br>Group Project Brainstorm  |
| Week 4       | Rejection Regions, P-values, Power                                        |
| Week 5       | Confidence Intervals & T-Distribution/T-test & Asymptotic Testing         |
| Week 6       | Asymptotic Testing , Paired T-tests                                       |
| Week 7       | Paired T-tests, Small-Sample Testing (Fisher's Exact Test) ,<br>Midterm 1 |
| Week 8       | Confounding; A/B testing, ANOVA                                           |
| Week 9       | ANOVA, Estimable Functions, Contrast                                      |
| Week 10      | Contrast, ANOVA Effect Sample Size, Multi-Factor Models ANOVA             |
| Week 11      | Randomized Complete Block Designs (RCBD) & Latin Square                   |
| Week 12      | Factorial Designs , Regression and ANOVA connection                       |
| Week 13      | Midterm Exam 2, Random effect models                                      |
| Week 14      | Thanksgiving Recess, Group Presentations & Optional Topics                |
| Week 15 - 16 | Group Presentations & Optional Topics                                     |

## Course Details - Instructor Contact Details

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hu.3125@osu.edu (Please include 'STAT 3410' in the subject line; replies within 72 hours on school days)

## Course Details - Office Hours

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Wednesday 4:00 p.m. – 5:00 p.m. in Cockins Hall 205A, or by appointment

## Course Details - Additional Instructional Staff

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TA: Jiwon Hong ([hong.1069@osu.edu](mailto:hong.1069@osu.edu))

Office Hours: Tuesdays, 12:50-1:50PM, via [Zoom](#))

## Course Details - Class Meeting Details

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**Class Meeting Details:** 03:00 PM-03:55 PM - Pomerene Hall 250 - MWF

## Course Details - Course Description

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Principles of designing experiments; analysis of variance techniques for hypothesis testing; simultaneous confidence intervals; block designs; factorial experiments; random effects and mixed models; observational data. Prereq: 3202; or 4202 and 5730; or permission of instructor.

**Prerequisite(s) / Corequisites:** Prereq: 3202; or 4202 and 5730; or permission of instructor.

## Course Details - More About This Course

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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 Details - Course Learning Outcomes

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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 (JMP, R).
- Summarize and communicate statistical analysis appropriately.

## Course Details - Course Supplies

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- JMP Statistical Computing Software (available free to OSU students via <https://ocio.osu.edu/software/software-request-instructions>)
- R & RStudio (Open-source, free download via <https://posit.co/download/rstudio-desktop/>)
- Microsoft Office 365 ProPlus (Word/Excel, available free via BuckeyeMail)
- A device capable of scanning handwritten documents to single PDF files (e.g., tablet or scanning app)
- Scientific or basic calculator for in-class exams and periodic quizzes
- Optional Software: Python, Jupyter Notebook / JupyterLab, Google Colab

## Course Details - Canvas Assignment Schedule

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| Date     | Name                                        | Assignment Type | Points |
|----------|---------------------------------------------|-----------------|--------|
| 9/14/26  | <a href="#"><u>STAT 3410 Homework 1</u></a> | Assignment      | 65     |
| 10/2/26  | <a href="#"><u>STAT 3410 Homework 2</u></a> | Assignment      | 110    |
| 10/23/26 | <a href="#"><u>STAT 3410 Homework 3</u></a> | Assignment      | 70     |
| 11/6/26  | <a href="#"><u>STAT 3410 Homework 4</u></a> | Assignment      | 65     |
| 11/20/26 | <a href="#"><u>STAT 3410 Homework 5</u></a> | Assignment      | 90     |

## Course Details - Grading Policy

| Grading              |                                                          |            |
|----------------------|----------------------------------------------------------|------------|
| Homework Assignments | 5 Homeworks (5 pts each, lowest score dropped)           | 20 Points  |
| Periodic Quizzes     | 5 Periodic Quizzes (5 pts each, lowest score dropped)    | 20 Points  |
| Midterm Examinations | 2 In-Class Exams (Midterm 1: 15 pts   Midterm 2: 15 pts) | 30 Points  |
| Final Group Project  | 4 Milestones (Median target score ~25 pts)               | 30 Points  |
| Total Score          | ---                                                      | 100 Points |

## Course Details - Grading Scale

| Letter Grade | Percentage Range |
|--------------|------------------|
| A            | 100% to 93%      |
| A-           | < 93% to 90%     |
| B+           | < 90% to 87%     |
| B            | < 87% to 83%     |
| B-           | < 83% to 80%     |
| C+           | < 80% to 77%     |
| C            | < 77% to 73%     |
| C-           | < 73% to 70%     |
| D+           | < 70% to 67%     |
| D            | < 67% to 60%     |
| E            | < 60% to 0%      |

## Course Details - Other

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### Homework Policy

- There are 5 homework assignments (5 points each; total 20 points). The lowest homework score is automatically dropped.
- Full score requires attempting every problem and showing all supporting work and software outputs.
- Generative AI Rule: If Generative AI tools (e.g., ChatGPT) are used, you must explicitly show your original working attempt BEFORE displaying the AI solution. Submitting perfect AI-generated answers without the trace of working on your own first will result in point deductions. This mitigates empty completion and false mastery.
- Solutions will be handed over by the TA after all students submit.

### Periodic Quizzes Policy ( In-Class Checks):

- Purpose: To reward consistency, lower assessment anxiety, and emphasize immediate feedback for real-time learning.
- Format & Peer-Correction: Immediately following the quiz, answers will be shown in class. Students will swap papers, using a different color pen to circle errors and correct mistakes in real time before papers are collected.
- 5-Point Scoring System (80/20 Effort-to-Accuracy Split): - 4 Points (80%): Awarded automatically for attempting every question and fully participating. - 1 Point (20%): Awarded for getting the majority of questions correct. - 0 Points: Assigned if absent or not participating.
- Drop Policy: The lowest Periodic Quiz score will be automatically dropped at the end of the term to accommodate unexpected real-life issues (illness, emergencies, or a bad day).

### Midterm Examinations:

- Midterm 1: October 9th in class (15 points).
- Midterm 2: Late November before Thanksgiving in class (15 points).
- Shorter (45min), focused in-class exams evaluating core techniques.

### **Final Group Project (30 Points):**

- Class median score will be controlled around 25 points.
- Milestone 1 : Form a group & Project Proposal & Office Hours Check-In. Draft a 1-page proposal defining research question, data source, and collection method. Visit office hours for instructor feedback and approval.
- Milestone 2 : Instrument & Pilot Study. Test data collection setup. If using software/scripts, run on yourself to catch bugs. If collecting human data, run a pilot study with  $\geq 5$  respondents (or  $\geq 2$  subjects) and verify initial descriptive analysis code.
- Milestone 3 : Raw Data & Cleaning Log. Submit complete, unedited raw dataset alongside a data cleaning log documenting handling of missing values, outliers, and reformatting.
- Milestone 4: Final Deliverable, Presentation & Reflection. Submit cleaned dataset, final report, presentation, and a short reflection on collection challenges and lessons learned.

## **Course Details - Course Policies**

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- Late Assignment Policy: Late assignments will be accepted with a 25% deduction when submitted within 24 hours of the deadline. No assignments will be accepted afterward. Contact the grader for any questions regarding late submissions.
- Mandatory Class Attendance Dates: Mandatory attendance is required on exam days, final project presentation days, and Quiz days

- **Bonus Points:** Bonus points will be awarded to students who win Best Final Group Project Presentation
- **Communication & Email:** Please include 'STAT 3410' in the email subject line. Replies are sent within 72 hours on school days.
- **Academic Civility & Discussion:** Maintain a respectful, supportive learning community in class and on discussion boards. Cite sources when making claims.
- **Health & Safety:** Follow current OSU Wexner Medical Center and Safe and Healthy Buckeyes health guidelines.

## Course Details - AI Use Policy

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GenAI can fabricate information (for example, creating citations to sources that do not exist) or omit key information. You are ultimately responsible for the accuracy and integrity of your submitted work. Unless explicitly permitted below, representing AI-generated content as your own work is a violation of the Code of Student Conduct.

### Use 1: Brainstorming and Ideation

- **Permitted:** You may use GenAI to generate topic ideas, suggest search terms, or outline potential arguments.
- **Prohibited:** The materials in this course may be subject to copyright protection. Do not input or allow AI to access external or instructor-created course materials (e.g., assigned readings, slides) without explicit instructor permission.

### Use 2: Feedback on Student-Created Work

- **Permitted:** You must personally author the entire initial draft without AI assistance. Then you may use GenAI to critique your logic, improve, etc.
- When seeking feedback, students may not use AI to generate new content, rewrite whole sections, fill in missing analysis or evidence, or create thesis statements or conclusions.

- Prohibited: The materials in this course may be subject to copyright protection. Do not input or allow AI to access external or instructor-created course materials (e.g., assigned readings, slides) without explicit instructor permission.
- Requirement: The core ideas and original text/work must remain yours. You are responsible for the accuracy and appropriateness of any AI-suggested revisions and ensuring that AI does not obscure your individual learning or voice. You should document and critically evaluate AI suggestions before accepting them.

### Use 3: Final Project and Presentation

- You must personally author all text/work; no AI-generated sentences, paragraphs, etc. may be included in your submission.

## Course Details - College and/or Department Policies

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- All student work must comply with university academic misconduct rules. Sharing or disseminating solutions constitutes academic misconduct.
- All written assignments and software output must be compiled and submitted as a single PDF on Carmen.

## Syllabus - University Policies

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### Office of Undergraduate Education - Standard Syllabus Statements

- [Academic Misconduct](#)
- [Religious Accommodations](#)
- [Accommodations for Disability and Illness](#)
- [Intellectual Diversity](#)
- [Grievances and Solving Problems](#)

- [Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct](#)
- [Copyrights](#)
- [Content Warnings](#)
- [Mental Health Support](#)
- [Resources for Military-Connected Students](#)
- [Campus-wide Class Cancellations](#)