

Stat 204: Introduction to Statistical Data Analysis

Fall 2025

Table of contents

1	COURSE INFORMATION	2
1.1	Course Description	2
2	LEARNING OUTCOMES	3
3	REQUIRED MATERIALS, TEXTBOOKS AND TECHNOLOGY	3
3.1	Laptop or Desktop Computer	3
3.2	Technology	3
3.3	Required Textbook	3
3.4	Other Recommended Books	4
3.5	Prerequisites	4
4	COMMUNICATION	4
5	ASSIGNMENTS & ASSESSMENT	4
5.1	Class participation: 10%	4
5.2	Homework: 30%	4
5.3	Midterm Exam: 25%	5
5.4	Final Project: 35%	5
5.4.1	Final Project Components:	5
5.5	Grading Scale	5
6	COURSE WEEKLY SCHEDULE	6
7	ATTENDANCE AND COURSE DELIVERY POLICY	6
7.1	In-Person Learning Community	6

8 ARTIFICIAL INTELLIGENCE (AI) POLICY	7
8.1 GenAI Tools and Learning	7
8.2 Why This Matters	7
8.3 AI for Study Support	7
9 ACCESSIBILITY	8
10 TITLE IX/CARE ADVISORY	8
11 ACADEMIC INTEGRITY	8
12 Academic integrity includes, but is not limited to, the following:	8
13 Academic misconduct includes, but is not limited to, the following:	9
14 STUDENT SUPPORT SERVICES	9
15 RELIGIOUS ACCOMMODATION	9
16 PRINCIPLES OF COMMUNITY	10

1 COURSE INFORMATION

Instructor: Marcela Alfaro Cordoba

Email: macordob@ucsc.edu

Office Hours: Tuesday & Thursday 1:15 pm - 2:00 pm (or by appointment)

Office Location: Engineering 2 – Room 527, but office hours in person will be near the classroom

Class Times: Tuesday & Thursday 11:40 am - 1:15 pm

Location: McHenry Library 1350

Quarter Dates: September 25, 2025 - December 5, 2025

Course Materials: Canvas and Course Webpage

1.1 Course Description

This course presents tools for exploratory data analysis (EDA) and statistical modeling in R. Topics include: numerical and graphical methods for EDA, linear and logistic regression, ANOVA, PCA, and tools for acquiring and storing large data. No R knowledge is required.

2 LEARNING OUTCOMES

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

- Comfortably load, manipulate, and analyze data within the R environment, building proficiency from no prior R knowledge to advanced statistical computing
- Apply numerical and graphical methods to explore datasets, understand data structures, and create meaningful visualizations using modern R packages
- Fit, diagnose, and interpret common linear models including linear regression, ANOVA, and logistic regression, with emphasis on model assumptions and validation
- Implement principal components analysis (PCA), clustering methods, and regularized regression techniques to handle complex, high-dimensional datasets
- Grasp the mathematical foundations underlying linear regression, ANOVA, logistic regression, and PCA, including key assumptions, theoretical properties, and when each method is appropriate to use
- Integrate exploratory analysis with statistical modeling to draw meaningful conclusions from real-world datasets, culminating in a comprehensive final project

3 REQUIRED MATERIALS, TEXTBOOKS AND TECHNOLOGY

3.1 Laptop or Desktop Computer

You will need a computer for homework, in-class activities, and projects. You will not be able to complete work on a mobile device. Students who need a laptop can make use of the library's borrow program: <https://library.ucsc.edu/services/computing/borrow-a-laptop>.

3.2 Technology

Personal computer with Canvas, R, and [Positron](#) installed. All these tools should be free for you, please make sure you have access WITHOUT payment. Ask me if you have any problems, and please DO NOT pay for any of them.

3.3 Required Textbook

R by Example (2012) by Jim Albert and Maria Rizzo, Springer Use R! Series

A free PDF copy of the textbook is available from the university library: <https://library.ucsc.edu>

3.4 Other Recommended Books

- **R for Data Science** (2017) by Garrett Grolemund and Hadley Wickham: <https://r4ds.had.co.nz/>
- **ggplot2** (2016) by Hadley Wickham, Springer Use R! Series
- **An Introduction to Statistical Learning** (2013) by Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani

3.5 Prerequisites

Familiarity with probability and statistical inference is assumed, along with some experience using matrix algebra operations.

4 COMMUNICATION

All lecture notes, assignment instructions, an up-to-date schedule, and other course materials may be found on this site. I will regularly send course announcements via Ed Discussion. Make sure to check it regularly. If an announcement is sent Monday through Thursday, I will assume that you have read the announcement the next day. If an announcement is sent on a Friday or over the weekend, I will assume that you have read it by Monday.

5 ASSIGNMENTS & ASSESSMENT

Assessment for the course consists of four components: class participation, homework, midterm exam, and final project.

5.1 Class participation: 10%

It is expected that you come to lectures and have discussions with your classmates. There will be activities to check participation in every lecture. These activities include weekly checks on the final project work starting on Week 4. If you have to skip lectures at some point, please post it on Ed Discussion (you can use the private mode), that will be my log for grading this part at the end of the quarter.

5.2 Homework: 30%

There will be 5 homework sets throughout the quarter. You may discuss homework assignments with other students; however, homework should be completed and submitted individually.

5.3 Midterm Exam: 25%

The midterm exam is tentatively scheduled for **November 20, 2025** (Week 8). More details about the exam format and content will be provided closer to the date.

5.4 Final Project: 35%

The final project should be done in groups of 2 students. These projects should be based on a chosen dataset and should include exploratory data analysis, as well as a full data analysis using the modeling approaches discussed in class.

5.4.1 Final Project Components:

1. **Project Proposal:** A short 1/2 - 1 page proposal that includes the chosen dataset and outlines the goals of the project. Additionally, a 5-minute presentation should be prepared.
2. **Project Presentation:** Full project presentations will take place during the final week of class. These should be about 10 minutes each. Part of the assessment will be to give feedback to your classmates, so attendance to all presentations is mandatory.
3. **Project Report:** The report should summarize the entire project, and incorporate the feedback given during presentations. This should be no more than 6 pages including figures and tables, but excluding references. The report is due by **5 pm on December 9th, 2025**.

5.5 Grading Scale

Percentage	Grade
90-100%	A
80-90%	B
70-80%	C
60-70%	D
< 60%	F

6 COURSE WEEKLY SCHEDULE

This schedule may change during the quarter. Please consult the class webpage for a more updated version.

Week	Dates	Topic
1	Sep 25, Sep 30, Oct 2	Introduction and basics of R
2	Oct 7, Oct 9	Numerical and graphical summaries
3	Oct 14, Oct 16	Advanced graphics
4	Oct 21, Oct 23,	Linear Regression and additional regression topics
5	Oct 28, Oct 30	Analysis of Variance (ANOVA)
6	Nov 4	Logistic regression
7	Nov 6, Nov 13	Principal component analysis and clustering
8	Nov 18, Nov 20	Regularized regression / Midterm Exam
9	Nov 25	Work on projects (Nov 27 - Thanksgiving)
10	Dec 2, Dec 4	Project presentations

Final Project Due: December 8, 2025 at 5:00 PM

7 ATTENDANCE AND COURSE DELIVERY POLICY

7.1 In-Person Learning Community

This course thrives on active participation and collaborative learning. To get the most out of our time together, regular attendance at lectures and discussion sections is essential for your success.

- **Exams:** All exams will be held in person to ensure fairness and academic integrity. This allows us to provide the best testing environment for all students.
- **Course Format:** We've designed this as an interactive, in-person experience that builds on daily discussions and activities. If you're unable to attend regularly this quarter, we'd encourage you to consider taking the course when you can fully engage with the learning community.

8 ARTIFICIAL INTELLIGENCE (AI) POLICY

8.1 GenAI Tools and Learning

We want to support your genuine understanding and skill development in this course. To ensure you're building the critical thinking and problem-solving abilities that will serve you beyond this class, all graded assignments (homework, worksheets, and exams) should reflect your own work and understanding. Using genAI tools like ChatGPT, Claude, or other language models for graded work would prevent you from developing these essential skills and would be considered academic misconduct.

8.2 Why This Matters

When you work through problems yourself, you're building neural pathways and deepening your understanding in ways that simply reading AI-generated solutions cannot replicate. These assignments are designed as learning opportunities, not just evaluation checkpoints.

8.3 AI for Study Support

You're welcome to use AI tools to create practice problems or generate study materials to help you explore concepts from different angles. This can be a great way to test your understanding! Just remember that AI can sometimes provide incorrect information, so always double-check against your course materials and use AI-generated content as a supplement to—not a replacement for—your assigned readings and exercises. Some tips:

- **Smart usage boundaries:** Use AI to understand concepts and check your approach, but always solve practice problems independently first. Remember: AI won't be available during exams, so build your own problem-solving confidence!
- **Use AI as a teaching assistant:** Ask for step-by-step explanations of concepts, alternative explanations if something doesn't click, and connections to previous topics you've studied.
- **Practice problem generation:** Have AI create variations of homework problems with different numbers or scenarios to test your understanding.
- **Protect class materials:** Do not upload or submit course materials (textbook excerpts, handouts, assignments) to AI platforms, as this creates copyright and author rights issues. Instead, ask general questions about concepts or create your own examples for AI to work with.

When in Doubt, Ask: If you're ever uncertain about whether a particular use of AI would be appropriate for your learning goals, please reach out. We're here to help you succeed while ensuring you're genuinely mastering the material.

9 ACCESSIBILITY

UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access to this course, please affiliate with the DRC. I encourage all students who would benefit from learning more about DRC services to contact DRC by phone at 831-459-2089 or by email at drc@ucsc.edu. For students already affiliated, make sure that you have requested Academic Access Letters, where you intend to use accommodations. You can also request to meet privately with me during my office hours or by appointment, as soon as possible. I would like us to discuss how we can implement your accommodations in this course to ensure your access and full engagement in this course.

10 TITLE IX/CARE ADVISORY

The Title IX Office is committed to fostering a campus climate in which members of our community are protected from all forms of sex discrimination, including sexual harassment, sexual violence, and gender-based harassment and discrimination. Title IX is a neutral office committed to safety, fairness, trauma-informed practices, and due process. Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, you can receive confidential support and advocacy at the Campus Advocacy Resources & Education ([CARE](#)) Office by calling (831) 502-2273. In addition, Counseling & Psychological Services ([CAPS](#)) can provide confidential counseling support, (831) 459-2628. You can also report gender discrimination directly to the [University's Title IX Office](#), (831) 459-2462. Reports to law enforcement can be made to UCPD, (831) 459-2231 ext. 1. For emergencies call 911.

11 ACADEMIC INTEGRITY

All members of the UCSC community benefit from an environment of trust, honesty, fairness, respect, and responsibility. You are expected to present your own work and acknowledge the work of others in order to preserve the integrity of scholarship, and the value of the degrees you and your peers are working so hard to earn.

12 Academic integrity includes, but is not limited to, the following:

- Being transparent and forthright in your academic work
- Reading the syllabus
- Asking questions about this academic integrity policy if you don't understand it

- Following exam rules
- Using only permitted materials during an exam
- Viewing exam materials only when permitted by your instructor
- Keeping what you know about an exam to yourself
- Incorporating proper citation of all sources of information
- Disclosing the use of any editing software or grammar tools
- Submitting your own original work

13 Academic misconduct includes, but is not limited to, the following:

- Disclosing exam content during or after you have taken an exam
- Accessing exam materials without permission
- Copying/purchasing any material from another student, or from another source, that is submitted for grading as your own
- Plagiarism, including use of Internet material without proper citation
- Submitting work that was produced in whole or in part by generative artificial intelligence
- Failing to properly cite external sources when their use is permitted
- Using cell phones or other electronics to obtain outside information during an exam without explicit permission from the instructor
- Submitting your own work in one class that was completed for another class (self-plagiarism) without prior permission from the instructor

Violations of the academic integrity policy can result in a permanent notation on your transcript, a failing grade on an assignment or in the course, and/or dismissal from the university. For the full policy and formal resolution procedures for academic misconduct, please refer to the [Academic Integrity Office](#).

14 STUDENT SUPPORT SERVICES

To learn about the many student services offered at UCSC—such as Learning Support Services (LSS), Resource Centers, or Slug Support—I encourage you to visit the Campus Resources website or click on the “Resources” button (a slug in a heart) at the bottom of the navigation ribbon on the left side of our Canvas page.

15 RELIGIOUS ACCOMMODATION

UC Santa Cruz welcomes diversity of religious beliefs and practices, recognizing the contributions differing experiences and viewpoints can bring to the community. There may be times

when an academic requirement conflicts with religious observances and practices. If that happens, students may request reasonable accommodation for religious practices. The instructor will review the situation in an effort to provide a reasonable accommodation without penalty. You should first discuss the conflict and your requested accommodation with your instructor early in the term. You or your instructor may also seek assistance from the [Dean of Students office](#).

16 PRINCIPLES OF COMMUNITY

The University of California, Santa Cruz expressly prohibits students from engaging in conduct constituting unlawful discrimination, harassment or bias. I am committed to providing an atmosphere for learning that respects diversity and supports inclusivity. I ask all members of this class to:

- Be open to and interested in the views of others
- Consider the possibility that your views may change over the course of the term
- Honor the unique life experiences of your colleagues
- Listen to each other's opinions and communicate respectfully
- Keep confidential discussions of a personal nature
- Ground your comments in course materials and maintain focus on learning together

This syllabus is subject to change. Any changes will be announced in class and posted on Ed Discussion.