

STAT 135 Syllabus Spring 2022

Class information

Lecture: Tues/Thurs 11:00-12:30

Lecture zoom link: <https://berkeley.zoom.us/j/94533961971?pwd=bFpacGtid0ZycmhReitSdjYwRnNtQT09>

Zoom Meeting ID: 945 3396 1971, *Passcode:* 897984

Lab sections: Fridays (various times)

GSIs:

- James Butler (butlerj@berkeley.edu)
- Sharon Hui (sharonwhui0066@berkeley.edu)
- Yaxuan Huang (yaxuan_huang@berkeley.edu)

Instructor information

Name: Rebecca Barter

Office: Evans 339

Email: rebeccabarter@berkeley.edu

Office Hours: Tues 9:30-10:30, Thurs 1:00-2:00

Office Hours location: In class zoom link (while remote) or in Evans 339

Course description

This course will cover an introduction to statistical theory and methodology. Topics include descriptive statistics, maximum likelihood estimation (MLE), non-parametric methods, goodness-of-fit tests, analysis of variance, bootstrap and computer-intensive methods and least squares estimation. The lab sections includes computer-based data-analytic applications to science and engineering.

Prerequisites

- Calculus and Probability equivalent to Stat 134 is a prerequisite.
- Stat 89A, Math 110 or equivalent linear algebra (matrix operations, inverse of a matrix, possibly eigenvalues) will be useful when we cover Linear Models.
- Experience with basic R operations (data structures, writing easy functions, tidyverse) is strongly recommended.

Topics

Approximate/tentative schedule:

- Introduction and motivations.
- Working with data: Data cleaning, Exploratory data analysis.
- Inference: Sampling, parameters, populations, confidence intervals, bootstrap, maximum likelihood estimation.
- Hypothesis testing: Null hypothesis and alternative hypotheses, p-values, significance levels and power, confidence intervals, tests for proportions, multiple testing issues, tests of comparison, χ^2 test, non-parametric tests.
- Causal inference (A/B testing): Neyman-Rubin potential outcomes, permutation tests.
- Linear models: Least Squares, Prediction, Linear regression, Logistic regression.

Grading

Letter grades are not given for homework, labs, and exams. Your letter grade for the course will be based on your work for the entire semester.

- Homeworks 20%
- Data projects 20%
- Midterm Exam 20%
- Final Exam 40%

Class attendance and participation

You are expected to attend all lectures and your assigned lab sections.

Lab sessions are led by GSIs who will cover additional examples, present additional helpful materials, and review content.

Homework and data projects

There will be **8 homework assignments** throughout the semester.

- The homeworks will together count for 20% of your final grade.
- The homeworks will focus on the mathematical and technical content covered in the lectures. Your homeworks should be typed up using LaTeX, R Markdown, or something similar.
- Since life happens sometimes, your lowest homework grade will be ignored (failing to submit a homework corresponds to a grade of 0 for that homework).
- Homework will be posted on bCourses and submitted via gradescope.

- If you aren't sure how to answer a question, write down some ideas or some concepts that you think would be helpful. Always show your working and explain your reasoning. Partial credit for partial answers will be given.

There will also be **3 data projects** throughout the semester:

- The data projects will involve applying the topics you have learned in the lectures and lab sections to real data problems.
- For each project, you will submit a short report explaining and exploring the data and summarizing your analyses and conclusions.
- Your project report should be written using R Markdown, but you may use alternative software with permission from Rebecca and your GSI.
- Unlike the homeworks, we will *not* drop your lowest data project grade.
- Data project assignments will be posted on BCourses and will also be submitted via gradescope.

Extensions

Every student may have *one* 24-hour extension for a homework or data project, no questions asked. If you are requesting an additional or a longer extension for a homework or data project, please try to request the extension at least 48 hours ahead of the due date in order to increase the likelihood of us accepting your request, but keep in mind that we are unlikely to approve additional requests for extensions. To request an extension please email both Rebecca and your GSI.

Exams

There will be one midterm, and a final exam. You will be allowed to take **one double-sided** page of notes into each exam. The midterm will take place during class.

You must take the exams to pass the class.

- Midterm: Thursday March 10
- Final Exam: Currently scheduled for May 12

Textbook

The course won't really be following a specific textbook, but here are a few resources that might be helpful:

- Mathematical Statistics and Data Analysis by John Rice
- R for Data Science by Hadley Wickham and Garrett Grolmund (<https://r4ds.had.co.nz/>)

Academic Integrity

We encourage students to work together, reviewing lecture materials, studying for exams, and collaborating on homeworks. However, your homework must not be a direct copy of another student's homework. Plagiarism is never ok.

Your homework, data project reports and code must be clearly different from your classmate's projects, but feel free to discuss the projects with your fellow students.

No collaboration is allowed on exams. Anyone caught cheating on a midterm or exam will receive a failing grade and will also be reported to the University Office of Student Conduct.

For additional information on plagiarism, self-plagiarism, and how to avoid it, see the following URLs:

- What is plagiarism? (<https://www.lib.berkeley.edu/research-support/cite-sources#Plagiarism>)
- Academic Misconduct: Cheating, Plagiarism, and Other Forms (<https://gsi.berkeley.edu/gsi-guide-contents/academic-misconduct-intro/>)
- Code of Student Conduct (<https://conduct.berkeley.edu/code-of-conduct/>)

Accommodations for students with disabilities

Please contact Rebecca via email as soon as possible if you need any particular accommodations so that we have time to organize the required accommodations.

Scheduling conflicts

Please notify Rebecca via email by the second week of the term about any known or potential extracurricular conflicts (such as religious observances, graduate or medical school interviews, or team activities). We will try our best to help you with making accommodations, but cannot promise them in all cases. In the event there is no mutually-workable solution, you may be dropped from the class.

Academic resources

Feel free to reach out to Rebecca or your GSI. We encourage you to utilize piazza and office hours to bring any issues, course-related or otherwise, to our attention. We will do our best to make sure that everyone in this course feels supported and has a good experience. If you cannot attend office hours, send an email and we can try to make other arrangements.

For the full range of academic services available to you, visit Campus Resources & Student Support Services.