Introduction to Statistics | 27:202:542 |
Lecture: Tuesday, 1:00-3:40PM | Room: HIL 215 |
Instructor: Frank Edwards | frank.edwards@rutgers.edu|
Office hours: Monday, 10:00-12:00 | Room: CLJ 547 |
TA: Chloe Sudduth | cms722@newark.rutgers.edu |
Office hours: TBA | Room: TBA |

Quick links

Lecture slides

Homework assignments

Course description

This is the course syllabus for Introduction to Statistics, Fall 2023. It is a graduate-level introduction to conducting quantitative social science research, and is the first part of a two-semester sequence. By the end of this course, you will be familiar with how to manipulate, visualize, and model quantitative data. You will also be familiar with the basic mathematical foundations of probability and statistics.

Course goals

1. Introduce students to statistical computing through the R programming language
2. Introduce core concepts in probability and statistics

Books

- Required: Imai, Kosuke and Nora Webb Williams. Quantitative Social Science: An Introduction in tidyverse. Princeton: Princeton University Press, 2022.
- Recommended: Alexander, Rohan. Telling Stories with Data. 2023. Available free online at https://tellingstorieswithdata.com/ or print via retailers.

Communication

I will post all class communications on Canvas. Email is my preferred mode of communication.

Expectations

- Masks are optional but encouraged. Please contact me if you or a member of your family / household is at high risk and we can adjust classroom norms appropriately to keep everyone safe.
- Attendance is mandatory. We move fast, it'll be hard to keep up if you miss lecture.
- Bring a computer - we'll be writing code in class.
- Complete homework on time. Homework should take between 4-8 hours to complete. *Don't start them the day before they are due.*
- Be respectful and professional. Be mindful of the space you take up in the classroom.
- Collaborate with your colleagues. Social science is a team sport. I encourage you all to work together to complete assignments. However, you DO need to submit your own work. We will penalize work that is copy/pasted from other students or online sources.
- Document your code. Explain what your code does in lots of detail. It helps you and helps us to evaluate your work.

Prerequisites

No prior statistics or programming experience is assumed. I assume that you are comfortable with algebra, geometry, and basic calculus.

Software

All instruction will be conducted in the R statistical programming language. R is free and open-source, and can be downloaded here.

We will be using the RStudio integrated development environment. RStudio provides a powerful text editor and a range of very useful utilities.

In addition to writing code, it is a great tool for writing reports, papers, and slides using RMarkdown. This syllabus, most of my course materials, and most of my academic papers are based on Markdown.

You are required to submit assignments using RMarkdown.

Lastly, I recommend learning some form of version control to ensure your work is a) backed up, b) easily accessible to collaborators and c) reproducible. Git and GitHub are great and flexible tools for software development that have powerful applications for researchers. Here's a useful intro to GitHub for R users.

Assignments and grading

Course grading is based in part on homework assignments (50%) and in part on a final project we will develop incrementally through the semester (50%). Guidelines for the final project will be provided for you during the second week of class.

Homeworks

Problem sets provide you an opportunity to directly apply what we've learned to real-world data analysis and statistical problems.

I will assign homework each week. Assignments are due the day before class. The deadline for homework submission is each Monday before class at 11:59PM.

Homework should be uploaded to canvas.

I expect to see your code, code output, and your interpretations of the results for each question. Please submit your homework as two files in both a compiled .html and raw .Rmd file.

Course schedule, topics, and readings

Date	Topic	Reading	HW
9/5	Introduction, math review	required: Alexander 1	HW 1
9/12	Introduction, R	required: Imai 1 (all), recommended: Alexander 2	HW 2
9/19	Causality (1)	req: Imai 2.1-2.4, rec: Alexander 3	HW3
9/26	Causality (2)	req: Imai 2.5-2.7, rec: Alexander 4	HW 4, Final Project 1
10/3	Measurement (1)	req: Imai 3.1-3.4, rec: Alexander 5	HW 5
10/10	Measurement (2)	req: Imai 3.5-3.9, rec: Alexander 6	HW 6, Final Project 2
10/17	Prediction (1)	req: Imai 4.1-4.2, rec: Alexander 7	HW 7

Date	Topic	Reading	HW
10/24	Prediction (2)	req: Imai 4.3-4.5, rec: Alexander 8	HW 8, Final Project 3
10/31	Probability (1)	req: Imai 6.1-6.2, Alexander 9	HW 9
11/7	Probability (2)	req: Imai 6.3-6.5, rec: Alexander 10	HW 10, Final Project 4
11/14	Uncertainty (1)	req: Imai 7.1-7.2, rec: Alexander 11	HW 11
11/21	Uncertainty (2)	req: Imai 7.3-7.4, rec: Alexander 12	HW 12
11/28	Looking forward (1)		
12/5	Final Project Presentations		Final Project due