Stat 365: Statistical Communication

Spring 2023

Instructor

Dr. Emily Robinson *(she/her)*

- Email: erobin17@calpoly.edu
- Office: Building 25 Office 103 (by Statistics Department Office)

Course information

Class Meeting Times: Mondays/Wednesdays

- Section 01: 1:10pm - 2:00pm
- Section 02: 2:10pm - 3:00pm

Class Location: 33-457 (Fisher)

Office Hours: Thursdays at 2:30pm - 4:30pm, in-person (25-103)

Course description

This two-unit course is designed to help students develop strong written communication skills in statistics and data analysis. Through guided practice and feedback, students will learn to effectively communicate statistical ideas and results to different audiences using appropriate graphs and tables. The course will cover strategies for discerning relevant and necessary information and for selecting and describing appropriate methods to analyze data, building on students' previous statistics coursework.

Prerequisites: Completion of GE Area A2, completion of GE Area A3, and a second course in Statistical Methods (STAT 252, STAT 302, or STAT 313).

Requirements: This course is required for Statistics majors but does not count toward the Statistics minor or any other degree program.

Course goals

By the end of this course, you will:

- Enhance your written communication skills in statistics and data analysis, specifically through the use of appropriate graphs and tables to convey statistical ideas and results.
- Synthesize output from statistical software to address research questions and analyze data with lexical precision and accuracy.
- Evaluate the statistical background of your intended audience, and adapt the style and content of your written reports to suit their needs and context.
- Demonstrate your understanding of statistical concepts such as parameters versus statistics, variability, p-values, margin-of-error, interaction, and scope of conclusions.
- Develop proficiency in writing and producing technical reports with adequate documentation to ensure reproducibility.
- Learn how to use spreadsheets, Tableau, and R for data visualization and communication.
- Gain experience in integrating statistical analysis, data visualization, and technical writing in a reproducible manner.

Textbooks

I have reserved eBooks for most of the textbooks and readings through the Cal Poly Library course reserves.

The main textbooks used in this course are:

- Communicating with Data: The Art of Writing for Data Science (Deborah Nolan and Sara Stoudt)
- Storytelling with Data (Cole Knaflic)

In addition to the textbooks, there will be a number of readings provided from other texts, including:

- Numbers in the Newsroom (Sarah Cohen)
- The Functional Art (Alberto Cairo)
- Visualize This (Nathan Yau)
- How to Lie with Statistics (Darrell Huff)
- Show Me the Numbers (Stephen Few)
- The Visual Display of Quantitative Information (Edward Tufte)
- Better Data Visualizations (Jonathan Schwabish)

and more.

Grading

In this class we will be using a contract grading system. This is designed to give flexibility and freedom to explore while ensuring a level of accountability. Learning to write takes practice. I do not want worries about grades to distract us from being creative, taking risks, and ultimately finding our voices.

You are guaranteed a grade of a B for this class if you meet the following conditions:

- Submit assignments (readings, writing prompts, class activities, peer reviews, and final report check-points) on time and meet the "satisfactory" criteria with a maximum of 3 missed assignments.
- Complete all mini-projects on time and meet the "satisfactory" conditions on the rubrics.
- Submit the final technical report on time and meet the "satisfactory" conditions on the rubric.

Your grade will decrease by a third of a step (for example a B to a B-) for each B condition that you do not meet. Missing assignments will be scaled, so that if for example you miss six assignments, turn in two mini-projects late, or turn in your final technical report late your grade will decrease by two thirds of a step (for example a B to a C+).

A missing final technical report submission will result in a maximum grade of a D+ at the instructor's discretion.

You can increase your letter grade by *up to* a third of a step (for example a B to B+) for meeting each of the following conditions (further instructions will be provided):

- Complete a weekly submission to the NYT: What's going on in this graph, missing no more than three weeks throughout the quarter.
- Listen to the 99% Invisible podcast on Florence Nightingale: Data Viz Pioneer. Find the data set to recreate the rose diagram, compare with a stacked bar plot, discuss the story, and argue why Florence needed the rose diagram.
- Select a data set from TidyTuesday or Makeover Monday and use guiding principles to create an effective dashboard using Tableau or RShiny to highlight key points.
- Participate in The Stats+Stories 300th Episode Data Visualization Contest.
- Make your own website using Quarto and GitHub to showcase your statistical projects.
- Complete a technical report project that goes above and beyond the requirements. Your job is to convince me in an additional one page document why you think your contribution goes the extra mile.
- I encourage you to suggest your own "boosting" condition via the suggestion "box" form on Canvas.

For example, to earn an A in this class you must meet the conditions for a B and complete three of the "boosting" conditions above to "satisfactory" quality.

Any deviation from the grading policies outlined above will only be to your benefit.

Grade Breakdown

1. **Readings and participation:**

You will be expected to complete assigned readings before coming to class and participate in class discussions and activities. Your peer review participation and engagement in class will be evaluated throughout the quarter.

2. **Writing prompts and activities:**

Throughout the course, you will be given writing prompts and activities to help you develop your technical writing skills. These will include assignments such as summarizing statistical findings, interpreting graphs and tables, and writing up executive memos. These assignments will be designed to help you practice communicating complex statistical concepts and analyses clearly and effectively.

3. **Mini-projects:**

There will be three mini-projects throughout the quarter, each designed to help you develop and apply your statistical communication skills. The mini-projects will include:

- *One Number Story:* In this assignment, you will choose a single number that summarizes a key finding from the provided data set and craft a compelling story around it, using appropriate statistical evidence to support your claims.
- *Copy the Masters:* For this assignment, you will reproduce graphics from FiveThirtyEight. You will use good data visualization principles and practicies.
- *Build your resume:* In this assignment, you will create a resume using Overleaf to highlight your education, statistical communication and technical skills, statistics and data science projects, and other relevant experiences.

Detailed rubrics will be provided for each mini-project to help guide your work and ensure that you meet the required standards.

4. **Technical report project:**

The technical report project is the culminating assignment of the course, where you will have the opportunity to apply all the skills and knowledge you have acquired throughout the quarter. This will be completed individually. You will be required to choose a research question, collect and analyze data using appropriate statistical methods, and produce a technical report that effectively communicates your findings. You will be provided with guidelines and resources to support your work, and you will receive feedback and guidance throughout the project. The technical report project will be evaluated based on its clarity, thoroughness, and adherence to standard statistical practices.

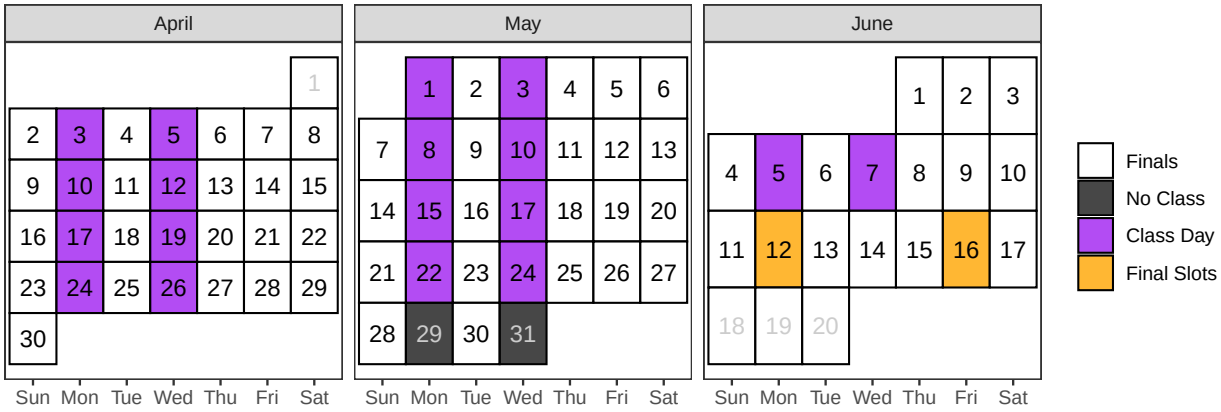
Late work

I understand that unexpected events may arise during the quarter that may prevent you from submitting your assignments on time. To accommodate for this, you will be given four 24-hour late submission "tokens" to use throughout the quarter. To use a token, you must (1) send me an email and (2) fill out the deadline extension form here. The extension request must be submitted **before** the assignment due date.

These tokens **cannot** be used on your final technical report submission.

Your remaining tokens will be tracked in a Canvas assignment as four points, with each token worth one point.

Class Schedule



This schedule is **very** tentative and subject to change.

Week	Topics	Readings
1: 4/3, 4/5	Writing about Data Designing a Study	CwD (ch. 1, ch. 10.3), How to Lie with Stats (ch. 10)
2: 4/10, 4/12	Data Journalism Spreadsheets, summaries, and pivot tables	CwD (ch. 2), Numbers in the Newsroom (ch. 1, 2)
3: 4/17, 4/19	Descriptive Statistics Tables	CwD (ch. 3.1 - 3.3)

Week	Topics	Readings
4: 4/24, 4/26	Intro to viz Color	Storytelling with Data Podcast Episodes #27: what is data visualization and #67: beginner mistakes in data viz Communicating Data with Tableau ch. 2
5: 5/1, 5/3	Perception + Principles Simplification	Storytelling with Data Episode #8: The many myths of data visualization (Optional) Show me the numbers (ch. 5)
6: 5/8, 5/10	Statistical Tendencies Writing reports	CwD ch. 7.1 - 7.5 (Optional) CwD ch. 8.1 - 8.7
7: 5/15, 5/17	ADEPT with Professor Smith Infographics & Dashboards	Twenty-five Analogies for Explaining Statistical Concepts (Behar, Grima, and Margo-Almagro)
8: 5/22, 5/24	Visit from Career Center Finding Internships + Online Presence	
9: 5/29, 5/30	**No Class -** watch Canvas for asynchronous material Memorial Day, Instructor traveling for an academic conference	
10: 6/5, 6/7	Project Workdays	
Finals *Reserve these times for potential final grade meetings.*	**Friday, June 16th at 1:10 - 4pm:** Section 01 *(if you come to class 1:10 - 2pm)* **Monday, June 12th at 1:10 - 4pm:** Section 02 *(if you come to class 2:10 - 3pm)*	

Course Expectations

You will get out of this course what you put in. The following excerpt was taken from Rob Jenkins' article "Defining the Relationship" which was published in The Chronicle of Higher Education

(August 8, 2016). This accurately summarizes what I expect of you in my classroom (and also what you should expect of me).

"I'd like to be your partner. More than anything, I'd like for us to form a mutually beneficial alliance in this endeavor we call education.

I pledge to do my part. I will:

- *Stay abreast of the latest ideas in my field.*
- *Teach you what I believe you need to know; with all the enthusiasm I possess.*
- *Invite your comments and questions and respond constructively.*
- *Make myself available to you outside of class (within reason).*
- *Evaluate your work carefully and return it promptly with feedback.*
- *Be as fair, respectful, and understanding as I can humanly be.*
- *If you need help beyond the scope of this course, I will do my best to provide it or see that you get it.*

In return, I expect you to:

- *Show up for class each day or let me know (preferably in advance) if you have some good reason to be absent.*
- *Do your reading and other assignments outside of class and be prepared for each class meeting.*
- *Focus during class on the work we're doing and not on extraneous matters (like whoever or whatever is on your phone at the moment).*
- *Participate in class discussions.*
- *Be respectful of your fellow students and their points of view.*
- *In short, I expect you to devote as much effort to learning as I devote to teaching.*

What you get out of this relationship is that you'll be better equipped to succeed in this and other college courses, work-related assignments, and life in general. What I get is a great deal of professional and personal satisfaction. Because I do really like you [all] and want the best for you."

Learning Environment and Support

I am committed to creating a safe and inclusive learning environment where all students feel respected and supported. If there are any ways I can improve the classroom environment to make it more welcoming for you, please don't hesitate to let me know.

If you have a disability and require accommodations to fully participate in the course, please contact me as soon as possible to discuss how I can best support you. I also encourage you to register with Cal Poly's Disability Resource Center (Building 124, Room 119 or at 805-756-1395) to explore additional accommodations that may be available to you.

If you are experiencing food insecurity, housing instability, or other challenges that may impact your ability to succeed in this course, please refer to the resources listed on Canvas under "Student Support Services at Cal Poly." These resources provide a range of essential support services, including emergency financial assistance, counseling, and academic support.

I am committed to working with you to ensure that you have the resources and support you need to succeed in this course. Let's work together to create a positive and inclusive learning environment for all students.

Academic Integrity

Academic integrity is a fundamental value of this course and of the university. Simply put, I will not tolerate cheating, plagiarism, or any other form of academic dishonesty.

Any incident of academic misconduct, including dishonesty, copying, or plagiarism, will be reported to the Office of Student Rights and Responsibilities.

Cheating or plagiarism will result in an incomplete grade for the assignment and an overall grade deduction of one-third (e.g., B to a B-). In cases of flagrant cheating, a grade of F for the course may be assigned.

It is important to note that paraphrasing or quoting another's work without proper citation is a form of academic misconduct. This includes using Chat GPT, which should only be used to generate ideas and not as a substitute for your own work.

To ensure academic integrity, please be sure to cite all sources appropriately and only use Chat GPT in an ethical manner. For more information on academic misconduct and what constitutes cheating and plagiarism, please see academicprograms.calpoly.edu/content/academicpolicies/Cheating.

Acknowledgments

I would like to acknowledge the contributions of various individuals whose work has been incorporated into this course. Special thanks to Beth Chance, Allan Rossman, Amelia McNamara, and Sara Stoudt for their valuable materials and inspiration.