Communication

DATASCI 540

Instructor: Prof Hadley | chadley@emory.edu | Office: PAIS 567
Office hours: (in person) (on zoom)

How do we best communicate our science to audiences? How do we craft succinct but compelling abstracts? How do we convey uncertainty in our estimates? How do we ethically and honestly give an audience the information they need to make a decision? How do we organize study materials into a single replicable package? How do we make posters that people want to read?

This course is a workshop in which you will practice ethically and effectively communicating quantitative information through a variety of modes and to a variety of audiences, ranging from the general public to professional peers. The aim of the course is to provide students with foundational and practical skills for communicating quantitative information. We will have *ample* opportunities for practicing and refining these skills. To achieve this, typically class will often include a 20-30 minute lecture, followed by in-class work, and sharing or a full lecture with the following class devoted to practice. You will develop prose, speech, and visuals as you produce a variety of genres, including a science news article, a popular article, a scientific poster and research report, and presentations. We begin the course with practical tips, theory and time to practice a range of communication skills. We end with a series of seminar style classes where we will read, discuss, (and discuss how to implement) research on communication.

Note that this is a new version of QTM54. The Dept of QTM acknowledges the pedagogical expertise and development from the Writing Program in earlier versions of this course .

Course Objectives

By the end of this course, students will be able to

- Use writing to produce, interpret, analyze, and evaluate and describe complex datasets and analyses, and produce technical and professional documents, and visuals.

- Ethically design, produce, and deliver—in multiple modes—communication that incorporates quantitative data.

- Tailor communication about complex data to audiences with diverse educational, cultural, and linguistic backgrounds, who have varying levels of expertise

- Be up to date on research on science communication, and understand how to use that research to craft effective communication to diverse audiences.

- Create dynamic documents that enable reproducible research.

- Understand and practice writing as a process, recursively implementing strategies of research, drafting, revision, editing, and reflection.

Expected Course Time Commitment:
Two 1.25-hour in class plus ~3 hours of regular, out-of-class work required as preparation for in-class work

Some Key Dates

Fall break October 14-15, No Class/ *lecture online on the Oct 16*

Thanksgiving break Nov 27-29, No Class/ *lecture online on 25th*
Final presentations Dec 8,10 Classes end
Dec 10

Communication with Instructor

The instructors will try to respond to emails and questions posted to Canvas within 48 hours. In order to facilitate efficient communication, we ask that you post questions related to material and administrative policies to Canvas and to check Canvas and the syllabus before asking a question. If you have a question of a personal nature, then please email the instructors. The instructor is unlikely to respond until the next business day over the weekend or right before something is due, so please plan ahead as much as possible.

Attendance Policies

We do a lot of inclass work. This course may be somewhat different from others that you have taken in that a healthy percentage of **in-class time is dedicated to reading, annotating, writing,**

coding, and discussion. All of this activity is designed to prepare you for peak performance on the assignments and in life. Attendance, therefore, is essential.

Academic Integrity

The Laney Graduate School Honor Code (https://gs.emory.edu/handbook/honor-conduct-grievance/honor/index.html) is in effect throughout the semester. By taking this course, you affirm that it is a violation of the code to cheat on exams, to plagiarize, to deviate from the teacher's instructions about collaboration on work that is submitted for grades, to give false information to a faculty member, and to undertake any other form of academic misconduct. You agree that the instructor is entitled to move you to another seat during examinations, without explanation. You also affirm that if you witness others violating the code you have a duty to report them to the honor council.

I take plagiarism and other forms of academic dishonesty seriously. Should I suspect that you engage in academic dishonesty in this course, I will refer the case to Emory's Honor Council. You may also receive an F on the assignment(s) in question.

Generative AI

ChatGPT and other generative AI tools can do much of the work that we will learn in this class. A vast amount of research shows, however, that if you want to really learn material, you should actually practice it yourself. **It definitely takes more effort and is more difficult than simply asking ChatGPT, but you're guaranteed to come away from the class with more knowledge, practice, and fulfillment.** I respectfully ask that you do not use ChatGPT or other genAI programs while working in-class, and I'd prefer you not use these tools outside of class for assignments .

Course Grades

Your course grade will be made up of each of the following components;

In class participation (20%)

Assignments x 5 (50%)
Final presentation and project (20%)

Possible Assignments/project (ideas)

1. Mapping: Locate a popular write up of a scholarly article and find the accompanying article. Identify three results from the popular article and link them to the results in the scholarly paper.
2. Write an abstract, dissect an abstract
3. You will "translate" a scholarly article from your field that employs quantitative methods into a short article written for the general public. Emphasis on core principles learned in class.
4. Find a paper: turn it into popular write up, turn it into a poster, turn it into a presentation
5. Find a popular write up - look at the actual paper: compare and contrast.
6. Create an R markdown file
7. Communicating uncertainty: Produce three different ways to communicate uncertainty.
8. Translate a result or statistical procedure for a lay audience, statistical experts, area expertise, mixed group of stakeholders.
9. P-values vs confidence intervals vs reporting effect sizes.
10. Make a poster.
11. Get some data and a result: Present it three different ways

Tentative Schedule of Events

Introductions

Week 1 (Aug 28)
Overview- walkthrough syllabus, expectations, **days off in October and November.**

Basic principles of quantitative writing

Week 2
(9/2): - No class labor day.
(9/ 4): (1) Seven basic principles for quantitative writing, (2) Writing about statistical significance and causality - for technical and lay audiences.

Reading:
Sutherland, William J., David Spiegelhalter, and Mark Burgman. "Policy: Twenty tips for interpreting scientific claims." *Nature* 503.7476 (2013): 335-337.

Writing about the basics.

Week3
(9/9): More principles for technical writing

(9/11): How to choose effective examples - for technical and lay audiences. (3) GEE Generalized, example, exception.

Reading:
Borowiec BG (2023) Ten simple rules for scientists engaging in science communication. PLoS Comput Biol 19(7): e1011251. https://doi.org/10.1371/journal.pcbi.1011251

Abstracts!

Week 4 (9/16). How to write a compelling, honest abstract. ●
- CONSORT for randomized trials.
- STROBE for observational studies
- PRISMA for systematic reviews and meta-analyses

Reading: TBD

In class assignment: Find an abstract, and dissect it.

Two meetings on writing about uncertainty and effects size

Week 5
(9/18): (1) Communicating effect size (2) Communicating comparisons - for technical and lay audiences, (3) when and how to discuss uncertainty.
(9/23): Describing and interpreting interactions and group comparisons! .

Reading: Fischhoff, Baruch, and Alex L. Davis. "Communicating scientific uncertainty." *Proceedings of the National Academy of Sciences* 111.supplement_4 (2014): 13664-13671.

Van Der Bles, Anne Marthe, et al. "Communicating uncertainty about facts, numbers and science." *Royal Society open science* 6.5 (2019): 181870.

Creating reproducible research projects "(one click replication") Week 6

(9/25, 9/30):
Introduction to (and application of) R markdown
The reason behind reproducibility:
How to:
Using R markdown and making dynamic documents.
The TIER protocol as a framework for organizing an entire project.

Read/watch: https://rmarkdown.rstudio.com/authoring_quick_tour.html

Pulling it all together & writing it up

Week 7
(10/2): (2) Writing about multivariate models, interactions, and effect modification. (10/7): Wrapping it all up: Intros, conclusions, and abstracts, How much to include in methods sections?,Reading:

In class: Activity

Reading: Selection from: Miller, Jane E. *The Chicago guide to writing about multivariate analysis*. University of Chicago Press, 2013.

Visualizing data

Week 6
(10/9) : Tables: Best practices in producing tables, for research and for lay audiences.

In class: Activity, making tables

10/14 Fall Break

(10/16) Why it is important to visualize your data (ONLINE LECTURE)
Visualizations - **Basic principles of visualization** from Cairo & Schwabish
In class: Activity, making figures

Visualizing and communicating uncertainty

Week 7
(19/21): More on the basics of visualization.
(10/23) Visualizing and communicating uncertainty

In class: Activity, making figures that convey uncertainty. Practice different types of graphs, visualizations.

Posters: Showing the audience what they want to see

Week 8
(10/28) Day 1: Core principles and examples,
(10/30): Day 2: Rapid poster design (Halloween /candy data)

Reading: Faulkes, Z. (2023). The "wall of text" visual structure of academic conference posters. *Front. Commun.* 8. doi:10.3389/fcomm.2023.1063345

In class: Rapid poster preparation!

Speaking and preparing presentations

Week 9
(11/4): (1) Principles for designing scholarly talks, (2) The assertion-evidence method for presentations.
11/6: (2) *Working:* Practice the Assertion evidence. Take an article, and make slides for two results.

Reading: Green, Emily P., and Emily P. Green. "The basics of slide design." *Healthy Presentations: How to Craft Exceptional Lectures in Medicine, the Health Professions, and the Biomedical Sciences* (2021): 37-62.

Topics in communication:

Week 19
(11/11): The science of communication: The importance of trust. Warmth and knowledgeability.

Van Der Bles, Anne Marthe, et al. "The effects of communicating uncertainty on public trust in facts and numbers." *Proceedings of the National Academy of Sciences* 117.14 (2020): 7672-7683.

Week 12 (11/13): The science of science communication, talking about distributions.

Week 13
(11/18): The importance of framing

Readings: Bubela, Tania, et al. "Science communication reconsidered." *Nature biotechnology* 27.6 (2009): 514-518.

Nisbet, Matthew C., and Dietram A. Scheufele. "What's next for science communication? Promising directions and lingering distractions." *American journal of botany* 96.10 (2009): 1767-1778.

Week 13
(11/20): Practicing framing

Week 14 - NO CLASS

Week 15: (12/2): LLMs Week
15: (12/4): TBD

Week 16 (12/9): Student presentations.