

Quantitative Research Methods

COMM 6820

Fall 2026

Mondays, 10:10Am-12:40Pm

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Office Hours: By appointment

Introduction and Course Description

The goal of this course is to provide new PhD students with a foundation for designing, conducting, and evaluating quantitative research in Communication and related social scientific fields. We will focus primarily on the relationship between theory and methods, as well as on communicating ideas clearly.

After taking this course, students should be able to:

- Develop research ideas and turn them into empirical questions.
- Design and conduct ethical social scientific studies using quantitative research approaches.
- Map theoretical constructs onto their concrete operationalizations.
- Develop reliable and valid measures of latent social constructs.
- Critically read reports of empirical research.
- Write transparent reports of studies that use quantitative research methods.

Course Structure, Weekly Readings, and Reaction Papers

I will assign three articles each week and expect you to finish reading them *before* class. In most weeks you will also submit one-page reaction papers on Canvas by 2:30pm on Fridays. In reaction papers you can (1) ask questions about things that are unclear, (2) raise issues we should discuss, (3) *constructively* criticize, and/or (4) comment on ideas you find interesting. The format is up to you. I will grade these in terms of completion.

The seminar will be divided into three segments:

- 10:10-10:50Am: I will do “interrupted lectures” in which I situate readings in contemporary discourse.
- 10:50-11:00Am: Break.
- 11:00-11:45Pm: Class discussion about questions and issues raised in reaction papers.
- 11:45-11:55Pm: Break.
- 11:55-12:40Pm: Skill building workshop.

Course Project: Design a Quantitative Study

Throughout the semester you and a partner will work together on designing a quantitative study on a topic of your choice. This project has multiple deliverables that are distributed throughout the semester:

- **September 18: Study topic and research questions.** Determine a topic of mutual interest and generate a set of research questions related to the topic that you think are important to study. Write a two-page paper that: describes the topic, explains what you hope to learn from studying it, and specifies at least two research questions.
- **October 9: Graphical causal model for your study.** Consider the relationships you are interested in studying as well as additional forces that might affect them, then develop a graphical causal model that depicts the relationships between variables you would need to account for in your study. In approximately five pages, explain the presence and absence of relationships depicted in your model.
- **November 13: IRB protocol due.** After thinking through the range of things participants will experience in your study, develop a full IRB protocol for your study. Download the PDF of your protocol from the RASS IRB system and upload it to Canvas; *do not submit your protocol to the IRB.*
- **November 23: Present research design to class for feedback.** Each team will present their research design to the class and get collective feedback to improve the project.
- **December 11: Final paper due.** After working through (and workshopping) your research design, your final assignment is to write a paper (up to 15 pages) in which you: (1) explain the rationale for your final research design choices; (2) discuss the tradeoffs associated with those choices—what will those choices allow you to learn, what knowledge will you forgo due to your design decisions; and (3) reflect on what you learned from the design and revision process that might inform how you consume and produce knowledge in the future. Part three should contain individual reflections for each author, as well as your joint reflection.

Grading

Grading consists of: participation (30%), reaction papers and short assignments (20%), and your semester-long project (50%).

Academic integrity

I expect all students to abide by the Cornell University Code of Academic Integrity at all times. Any work you submit must be your own. You must report all outside assistance—including any assistance of Artificial Intelligence technology (see next section)—and properly cite the works of others; note that sources need not be published to be cited: any resource that you use as a source—even if you are the author—must be cited.

Although I am aware that there are many differences in standards and definitions regarding academic integrity, in this class I apply the [Cornell University Code of Academic Integrity](#).

Artificial Intelligence Policy (adapted from professor danah boyd)

This class is designed to train *you* and your peers to conduct quantitative social science research. Since this class is part of a PhD program that trains humans to produce new knowledge, I expect the work you submit in this class to originate from your intelligent human mind. That said, I know that we now live in a world with powerful Artificial Intelligence (AI) tools that may be helpful for augmenting some human work under some

conditions. Indeed, as we will discuss several times throughout the course, there is a growing literature on the benefits and costs associated with using AI in social science research.

If you think AI will help improve your human-generated work for this class, you may use it to *assist* you. If you use an AI tool, however, **you must be transparent about your use.**

In each assignment for which you use AI, you must add an AI Statement at the end of your work. You must share your prompts and explain how the AI output was incorporated into your work. Note that this includes exploratory searches as well as text or images that you use in assignments. In your AI Statement, you must articulate why you chose to use AI, how the use of AI benefited your work, how you checked the quality of the information provided in the AI output, and how you considered the social and environmental trade-offs associated with using AI tools. **Failure to disclose your use of AI will be treated as a violation of Cornell's [Code of Academic Integrity](#).**

Accommodations

Please let me know as soon as possible if you require any accommodation to fully participate in the course.

Counseling Resources

It is quite common for students (and even professors!) to experience stressful events during the semester. Any of us can experience anxiety, depression, family stress, the loss of loved ones, financial strain, or other stressors. It is perfectly normal to seek the service of mental health professionals to get support to cope with these experiences. On Canvas I have shared the Cornell Mental Health Resources Guide, a guide created for and by students. I encourage you to use these resources and share them with friends.

If something happens and you require a short-term accommodation, please let me know as soon as possible. Your health and wellbeing come first, so I will do whatever I can to support you.

Course Schedule and Materials

Unit I: Research Design from the Researcher's Perspective

August 24 **Introduction & Ethics: Why are we here? What should we do? What *shouldn't* we do?**
We will discuss your research interests and goals and how those relate to this class. After that, we will do a class activity to get us thinking about how we will deal with some of the ethical issues associated with conducting quantitative social science research studies.

Homework (due: September 4th):

Complete CITI training ("RCR-Full: Full Course on Responsible Conduct of Research for Social & Behavioral Sciences") and upload completion certificate to Canvas.

August 31 **Why quantify? The logic of statistics in the social and behavioral sciences**
As you will learn throughout this graduate program, there are many ways to construct knowledge. This class focuses on *quantitative* methods. To use those methods effectively and responsibly, it is important to learn about the logic and assumptions behind them.

Please read the following before coming to class:

Bailey, D. H., Jung, A. J., Beltz, A. M., Eronen, M. I., Gische, C., Hamaker, E. L., ... & Murayama, K. (2024). Causal inference on human behaviour. *Nature human behaviour*, 8(8), 1448-1459.

Lundberg, I., Johnson, R., & Stewart, B. M. (2021). What is your estimand? Defining the target quantity connects statistical evidence to theory. *American Sociological Review*, 86(3), 532-565.

Nelson, A. (2026). Field Theory: AI as Social Science Question, Object & Tool. *Daedalus*, 155(1-2), 316-334.

In-Class Workshop: Establishing a Research Workflow

Homework: What do you see? Observational research assignment (due September 11th)

September 7 **NO CLASS: Labor Day Holiday**

September 14 **Developing research questions and hypotheses**
Now that we have discussed some ethical issues and why we quantifying, we will spend today talking about how to develop research questions and testable hypotheses.

Please read the following before coming to class:

Kimmerer, R. W. (2013). Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants. Milkweed Editions.

Margolin, D. B. (2019). Computational contributions: A symbiotic approach to integrating big, observational data studies into the communication field. *Communication Methods and Measures*, 13(4), 229-247.

Varian, H. R. (1997). How to build an economic model in your spare time. *The American Economist*, 41(2), 3-10

In-Class Workshop: An introduction to pre-registration and registered reports.

September 21 What are you *actually* interested in studying? People’s thoughts? What they say? Their behavior? Those are different processes and may require distinct research designs.

As the class progresses, we will cover many different tools that one can use to conduct research. Knowing *which* tools to use, though, requires some introspection about what it is that you actually want to know. Today we will cover a few categories of research to give you a sense of how methods might vary depending on what kinds of processes you’re studying.

Please read the following before coming to class:

Albarracin, D., Fayaz-Farkhad, B., & Granados Samayoa, J. A. (2024). Determinants of behaviour and their efficacy as targets of behavior change interventions. *Nature Reviews Psychology*, 3(6), 377-392.

Boyd, R. L., & Markowitz, D. M. (2025). Verbal behavior and the future of social science. *American Psychologist*, 80(3), 411-433.

Hariri, G. M. & Gosling, S. D. (2023). Understanding behaviours in context using mobile sensing. *Nature Reviews Psychology*, 2, 767-779.

In-Class Workshop: Managing tradeoffs in research designs.

September 28 What other forces might affect the processes you’re studying? How should you think about those forces in your research designs?

Because people are embedded in social contexts, sometimes features of those contexts have independent or additive effects on the processes we are interested in studying. Today we will discuss forces that influence people at different levels of the “ecological systems” we live in, and how to account for those forces in our research designs.

Please read the following before coming to class:

Rohrer, J. M. (2018). Thinking clearly about correlations and causation: Graphical causal models for observational data. *Advances in Methods and Practices in Psychological Science*, 1(1), 27-42.

Sen, M., & Wasow, O. (2016). Race as a bundle of sticks: Designs that estimate effects of seemingly immutable characteristics. *Annual Review of Political Science*, 19, 499-522.

Stier, S., Breuer, J., Siegers, P., & Thorson, K. (2020). Integrating survey data and digital trace data: Key issues in developing an emerging field. *Social Science Computer Review*, 38(5), 503-516.

In-Class Workshop: Linking data sources to study multiple levels of people's experiences.

October 5 Sampling, part I: *Who* are you interested in studying, and what do you need to know about them as you design your study?

Now that you know *what* you're interested in studying, we will discuss how you might go about selecting the appropriate sample(s) for studying those processes and outcomes. We will also discuss recent debates about using AI models to simulate human participants.

Please read the following before coming to class:

Alsalti, T., Rohrer, J. M., & Arslan, R. C. (2026). Thinking clearly about sampling and representation with the total survey error framework. *Social and Personality Psychology Compass*, 20(7), e70160.

McEwan, B. (2020). Sampling and validity. *Annals of the International Communication Association*, 44(3), 235-247.

Crockett, M. J., & Messeri, L. (2025). AI Surrogates and illusions of generalizability in cognitive science. *Trends in Cognitive Sciences*, 30, 203-215.

In-Class Workshop: Power and precision analyses

October 12 NO CLASS: Fall Break

Unit II: Research Design from the Participant's Perspective

October 19 Sampling, part II: The participant recruitment process

Now that you know who you want to study, you will need a plan for recruiting them.

Please read the following before coming to class:

D'Alonzo, K. T. (2010). Getting started in CBPR: Lessons in building community partnerships for new researchers. *Nursing Inquiry*, 17(4), 282-288.

Gross, E. B. & Gelman, S. A. (2025). Research with the reluctant: Challenges and strategies. *Advances in Methods and Practices in Psychological Science*, 8(1), 1-12.

Stagnaro, M. N., Druckman, J. N., Berinsky, A. J., Arechar, A. A., Willer, R., & Rand, D. G. (2026). Representativeness and response validity across nine opt-in online samples. *Nature Human Behaviour*, 1-14.

In-Class Workshop: Participant recruitment planning and associated tradeoffs

October 26

The independent variable: What will participants experience in your study?

This week we will focus mostly (though not exclusively) on manipulated independent variables. The issues involved with other kinds of independent variables are similar to those we will consider when we get to dependent variables.

Please read the following before coming to class:

Miller, L. C., Shaikh, S. J., Jeong, D. C., Wang, L., Gillig, T. K., Godoy, C. G., ... & Read, S. J. (2019). Causal inference in generalizable environments: Systematic representative design. *Psychological inquiry*, 30(4), 173-202.

Paluck, E. L., & Shah, A. K. (2025). Field research: Five approaches to theoretical development in the field. In D. T. Gilbert, S. T. Fiske, E. J. Finkel, & W. B. Mendes (Eds.), *The handbook of social psychology* (6th ed.). Situational Press.

Schnauber-Stockmann, A., Bayer, J. B., Harari, G. M., & Karnowski, V. (2025). The situation in media and communication research. *Communication Theory*, 35(1), 25-36.

In-Class Workshop: Developing study protocol + Intro to IRB submission process

November 2

Dependent variables: What are we measuring? What does it mean?

As discussed earlier in the class, we now live in a world with abundant data sources that can be used to study a variety of topics. Knowing whether data is appropriate for research purposes, however, requires careful investigation into what was actually measured; that determines the kinds of inferences we can make. We will discuss those issues this week.

Please read the following before coming to class:

Matias, J. N., & Price, M. (2025). How public involvement can improve the science of Artificial Intelligence. *Proceedings of the National Academy of Science*, 122(48), e2421111122.

Sarathy, J., & boyd, d. (2024). Statistical imaginaries, state legitimacy: Grappling with the arrangements underpinning quantification in the US Census. *Critical Sociology*, 08969205241270898.

Tepper, S. J., Spruill, M. K., Premachandra, B., & Lewis Jr, N. A. (2022). Surveys as conversations between makers and takers: A conversational framework for assessing and responding to community needs. *Analyses of Social Issues and Public Policy*, 22(3), 857-875.

In-Class Workshop: Questionnaire construction.

Unit III: Making Sense of What Happened in Your Study

November 9 Preparing for analysis and sharing your discovery process

After participants finish going through your study and you have collected data, you need to make sense of what happened. How do you prepare and analyze the data? How do you share that process with others so they can reproduce your findings? We will discuss that today.

Please read the following before coming to class:

Broman, K. W., & Woo, K. H. (2018). Data organization in spreadsheets. *The American Statistician*, 72(1), 2-10.

Lewis, N. A., Jr. (2020). Open communication science: A primer on why and some recommendations for how. *Communication Methods and Measures*, 14, 71-82.

Sakaluk, J. K. (2016). Exploring small, confirming big: An alternative system to The New Statistics for advancing cumulative and replicable psychological research. *Journal of Experimental Social Psychology*, 66, 47-54.

In-Class Workshop: Introduction to open science tools.

November 16 Visualizing and presenting data

In addition to running statistical tests, it is often helpful to *visualize* your data to understand underlying patterns and make inferences about them. Today we will cover visualization strategies (as well as approaches to avoid).

Please read the following before coming to class:

Halford, G. S., Baker, R., McCredden, J. E., & Bain, J. D. (2005). How many variables can humans process? *Psychological Science*, 16(1), 70-76.

Hehman, E., & Xie, S. Y. (2021). Doing better data visualization. *Advances in Methods and Practices in Psychological Science*, 4(4), 25152459211045334.

McGowan, B., & Silva, J. (2025). *Speak, Memorably: The Art of Captivating an Audience*. Harper Collins. (Chapter 6)

In-Class Design Time: Work with partner on preparing your presentation

November 23 Design presentations & feedback session

Each team will present their study design and get collective feedback to improve the project.

Unit IV: Sharing What You've Learned

November 30 Disseminating your research

You did it! You designed a great study, ran it, replicated it, now it's time to tell your peers and the world about it. This week we'll talk about how to do that.

Please read the following before coming to class:

Forscher, B. K. (1963). Chaos in the brickyard. *Science*, 142(3590), 339.

Gernsbacher, M. A. (2018). Writing empirical articles: Transparency, reproducibility, clarity, and memorability. *Advances in Methods and Practices in Psychological Science*, 1(3), 403-414.

Silvia, P. J. (2019). *How to write a lot: A practical guide to productive academic writing*. American Psychological Association. (Chapters 1 & 2)

In-Class Workshop: Developing writing plans and habits.

December 7 Applying research to social problems

Some researchers are interested in using their science to address social problems. In this final class, we will discuss the benefits and costs of public engagement for both scientists and society.

Please read the following before coming to class:

Ellsworth, P. C. (2021). Truth and advocacy: Reducing bias in policy-related research. *Perspectives on Psychological Science*, 16(6), 1226-1241

Lewis Jr, N. A., & Wai, J. (2021). Communicating what we know and what isn't so: Science communication in psychology. *Perspectives on Psychological Science*, 16(6), 1242-1254.

Michener, J. (2024). Ethical and transformative scholarly public engagement: Pitfalls, possibilities and promises. *Healthcare Policy*, 20(SP), 94-102.

Robinson, N. J. (2020, August). The truth is paywalled but the lies are free: The political economy of bullshit. *Current Affairs*.

In-Class Workshop: Developing science communication plans.

Acknowledgment: This syllabus was co-developed with Professor Andrea Stevenson Won. Prof. Won and I have rotated the teaching of this course over time. Our teaching collaboration has not only been fun for us to work on together; it has been essential for improving the course each year and ensuring that each new cohort learns about the latest developments in quantitative research methods in the social sciences.