PP 480 Nature of Inquiry: Quantitative Research Design in Social Science

Claremont Graduate University

Fall 2026

Seminar: Thursday, 1:00-3:50PM (PST)

Course Location: Academic Computing 214 &

Zoom Room [https://cgu.zoom.us/j/84025404824]

Instructor: Carlos Algara, Ph.D.
Office: 227 McManus Hall
Office Hours: Please email me to schedule.
carlos.algara@cgu.edu
https://calgara.github.io

Teaching Assistants: Jess Geiger
jessica.geiger@cgu.edu

Course Objectives: Research Design in the Social Sciences

This course is designed to be the first part of the Politics & Policy's methods sequence in political methodology. The research design foundation learned in this course will serve as the point of departure for PP 481 (Introduction to Statistical Analysis) and PP 482 (OLS Regression & Modeling).

The main focus of this course will be introducing students to the foundations of research design towards collecting and interpreting data to answer social science questions. With respect to data collection, this course will survey fundamental concepts of measurement and the importance of case selection. With respect to interpretation, this course will define correlations and causal effects, with a particular emphasis on introducing the idea of regression and basics of design-based causal inference. Towards that end, the specific objectives of this course include:

- (1) Establishing a "common language" underlying quantitative research design in the social sciences, such as understanding the fundamental difference between correlation and causation.
- (2) Understanding the fundamental role of variation towards describing relationships between two variables, with a particular focus on the importance of samples and statistical uncertainty.
- (3) Assessing what it means to establish causality, with focus on common methods used in the social sciences to establish causality such as randomized experiments, regression discontinuity designs, and difference-in-difference designs.
- (4) Lastly, students will understand the centrality of assessing causal mechanisms in evaluation of social scientific theories and the importance of measurement in research design.

Taken together, the major objective of this course is to introduce participants to the process of conducting original doctoral-level research. The fundamentals of research design allows us to consider how research is put together from beginning to end, which is a critical learning objective for any researcher. Participants will learn that a rang of analytical decisions must be made by researchers, which require clear assumptions, and that are not immune from critique. Indeed, we will approach research designs developed by scholars as assessing how prosecutors "lay out the case" for the conclusions reached by their designs and the relative merits of the analytical choices reached by the researcher. Note that this class is an introduction to research design in the social sciences and, as such, should serve as a foundational class that allows you to continue your methods training throughout your academic career. Indeed, this class will introduce some concepts that will be covered and applied in the computational courses (PP481 & 482) underlying the methods sequence.

Welcome to the course!

Course Logistics & Requirements

This section of the syllabus serves as a guide for course expectations (both for me and for you) and logistical information such as grade breakdown and course texts.

Course Texts, Materials, & Announcements: All course materials, such as lecture slidsets and problem set prompts, will be made available on the Course Canvas Page. We will be using selected readings following books in this course, note that I mark whether you have e-book access through the Claremont Colleges Library:

- ⋆ Bueno de Mesquita, Bueno & Anthony Fowler. 2021. *Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis*. First Edition. Princeton, NJ: Princeton University Press.[1]
- ⋆ Kellstedt, Paul M. & Guy D. Whitten. 2018. *The Fundamentals of Political Science Research*. Third Edition. New York, NY: Cambridge University Press.[2]

Grade Breakdown & Schedule:

- ⋆ 5% Class Discussion Participation Posts
- ⋆ 45% Problem Sets
- ⋆ 50% Final Project

Class Discussion Participation (5%): To make the seminar a useful experience, you **must** come to class prepared to discuss the readings and engage with other course material. This means you should already be familiar with each of the readings and be ready to raise (and answer) interesting questions about their arguments, findings, methodological strategies, etc., during class discussion. **In addition,** students are expected to complete a module reflection post articulating how the

[1] **This text will be referred to as TCD in the subsequent course road-map section**.
[2] **This text will be referred to as FPSR in the subsequent course road-map section.**

module's material helps us understand th important role of research design in the social sciences.

Problem Sets (40%): Each student will complete **six** homework assignments based throughout the semester, with the dates listed on the *Course Road-Map*. You are allowed (and ***encouraged***) to discuss the assignments with other students and work collaboratively. However, the final written work for the assignments (e.g., criticisms, interpretations) must be your own. Please complete the write-up of all of the assignments independently and note that ***no late problem sets will be accepted without prior arrangements***. Problem sets will be simply graded on the following scale:

- $\checkmark+$: Student put in the effort and got most of the answers correct
- $\checkmark$: Student finished the problem set but did not put the effort towards being thorough in responses
- $\checkmark-$: Student turned in an incomplete or did not turn in a problem set.

Final Research Design Project (50%): Each student will write an initial research design aimed at answering an empirical question in quantitative political science in a fashion similar to a pre-analysis plan (PAP). The final assignment submission should contain the following:

1. Clear articulation of a research question that is justified as a contribution in the standing literature
2. Synthesizes the literature relevant to the research question that outlines a theoretical argument that coherently tries to answer the research question posed
3. Articulates at least two "clear hypotheses" that describes a relationship between a clearly identified independent and dependent variable in which the direction of the effect is specified. Note that one hypothesis must be designated as the primary hypothesis and the other(s) as secondary or exploratory hypotheses.
4. Identify a research design by which to tests the hypotheses posited in the previous section, complete with a discussion of how the relevant independent, dependent, and control variables are measured along with the relevant unit of analysis and selection of cases identified. The research designs will be discussed in this course and can include:
    (a) Correlational observational descriptive analysis (i.e., designs that lack causal identification) focused on specifying a data collection plan specifying the primary sources underlying measurement of the relevant variables of interest. Note that given the lack of causal identification, this design needs a clear articulation of how the descriptive inference takes into account potential confounding variables.
    (b) Randomized experimental designs such as lab or quasi-experimental natural experiments. Note that selection of these designs merit a clear articulation of the specification of treatment and how randomization is achieved.

(c) Quasi-experimental methods to study questions where randomized experiments are not feasible, such as achieving causal identification through regression discontinuity (RDD) or difference-in-difference (DiD) designs. Note that selection of these designs merits clear articulation of why the research question cannot be studied with a randomized experiment, how treatment is theoretically defined, and how this treatment is measured in the research design.

The goal of this final assignment is for students to gain experience in thinking through research design and to gain experience constructing a pre-analysis plan. Ideally, this research design would be pursued in subsequent classes and eventually be put into action towards consideration for publication to a journal once the design is executed in manuscript form. ***Note that final projects will be due on December 13th.***

Claremont Graduate University Course Grading Scheme

Letter Grade Grade	Grade Point	Grade Description	Learning Outcome
A	4.0	*Complete mastery of course material and additional insight beyond course material*	*Insightful*
B	3.0	*Complete mastery of course material*	*Proficient*
C	2.0	*Gaps in mastery of course material; not at level expected by the program*	*Developing*
U	0	*Unsatisfactory*	*Ineffective*

Note that grades may contain pluses or minus designations as appropriate.

Course Policies

Course Attendance: Students are expected to attend all classes. Students who are unable to attend class must seek permission for an excused absence from the course director or teaching assistant. Unapproved absences or late attendance for three or more classes may result in a lower grade or an "incomplete" for the course. If a student has to miss a class, he or she should arrange to get notes from a fellow student and is strongly encouraged to meet with the teaching assistant to obtain the missed material. Missed assignments will not be available for re-taking unless *prior arrangements are made with the course instructor.*

Course Late Work & Incomplete Policy: Late assignments will not be accepted except in the event of a medical or family/personal emergency and with coordination with the instructor. Any request for an incomplete must be approved prior to the last day of class or accompanied by a doctor's note or evidence of a family emergency. Per CGU policy, no incompletes will be given after the conclusion of the semester and without completion of over half the course work assigned and with instructor approval.

CGU Academic Policies

Class Policies: The CGU institutional policies apply to each class offered at CGU. Students are encouraged to review the student handbook for their program as well as policy documentation in the Bulletin and on the Registrar's webpages: http://bulletin.cgu.edu/ and http://www.cgu.edu/registrar. The protocols defined by the CGU's Student Conduct Code must be upheld in all classes. For more information, please visit for CGU's Basic Code of Conduct (Links to an external site.).

Credit Hour: Credit hour refers to the units or credits earned by a student for the successful completion of a course at CGU. These are the units recorded on transcripts and the units that are counted toward degree requirements. For CGU courses, a single unit or credit is determined by 10.5 hours of instructional activity per semester. Instructional activity includes direct instructor contact in a physical or virtual classroom as well as asynchronous instructional content for online or hybrid courses. See the full policy here.

Academic Integrity: The work you do in this class must be your own. Information on CGU's Policy and Procedures for Violations of Standards of Academic Integrity can be found here. In addition, the Claremont Colleges Library has a number of resources on academic honesty and integrity, including the following online tutorial: here.

CGU Accommodations

Accommodations for Students with Different Abilities: CGU is committed to creating courses that are inclusive and accessible. If you would like to request academic accommodations due to temporary or permanent disability, contact the CGU Dean of Students and Coordinator for Student Disability Services at DisabilityServices@cgu.edu or (909) 607-9448. Reasonable accommodations are considered after you have conferred with the Office of Disability Services (ODS) and presented the required documentation of your disability to the ODS. Planning is essential, so please communicate to the ODS as soon as possible.

Religious Accommodations: Students who expect to miss classes or assignments as a consequence of their religious observance shall be provided with a reasonable alternative opportunity to complete such academic responsibilities.

Mental Health and Well Being: Graduate school is a context where mental health struggles can arise or be exacerbated. If you ever find yourself struggling, please ask for help. If you wish to seek out campus resources, here is some basic information: services.claremont.edu/mcaps/. Monsour Counseling and Psychological Services (MCAPS) is committed to promoting psychological wellness for all students at The Claremont Colleges. Professional and well-trained psychologists, psychiatrists, and post-doctoral and intern therapists offer support for a range of psychological

issues in a confidential and safe environment.

Phone (909) 621-8202
After hours emergency (909) 607-2000
Tranquada Student Services Center, 1st floor
757 College Way
Claremont, CA 91711

Title IX: Title IX. One of my responsibilities as an instructor is to help create a safe learning environment. I am a mandatory reporter. Thus, if I learn of any potential violation of CGU's gender-based misconduct policy (e.g., rape, sexual assault, dating violence, domestic violence, or stalking) by any means, I am required to notify the CGU Title IX Coordinator at Deanof.Students@cgu.edu or (909) 607-9448. Students can request confidentiality from the institution, which I will communicate to the Title IX Coordinator. If students want to speak with someone confidentially, the following resources are available on and off campus: EmPOWER Center (909) 607-2689, Monsour Counseling and Psychological Services (909) 621-8202, and The Chaplains of The Claremont Colleges (909) 621-8685. Speaking with a confidential resource does not preclude students from making a formal report to the Title IX Coordinator if and when they are ready. Confidential resources can walk students through all of their reporting options. They can also provide students with information and assistance in accessing academic, medical, and other support services they may need.

Your Physical Health: . I am also committed to ensuring the health and safety of the CGU community. Information on CGU's COVID Semester protocol can be found here: https://info.cgu.edu/emergency/ and I suspect it will be updated, as needed, as we progress.

Campus security: Campus security can be reached 24 hours/day at (909) 607-2000. Please download the CGU Safety Resource Card to your phone's contacts.

Tech Issues: The Office of Information Technology has a helpdesk to support you with CGU wireless access and email issues. They also have good documentation you can use to learn to connect and use online resources. Website: https://mycampus.cgu.edu/web/it.

Center for Writing and Rhetoric (CWR): CGU has a graduate studies-focused Center for Writing and Rhetoric that works with you no matter where you are in the writing process. The CWR is not just for remediation of your writing, but for all writers to provide partnership and consultation to improve your academic work at all levels. The CWR can work with you in planning, outlining, drafting, and final review of documents and presentations for class work, conferences, and publications. Website: https://mycampus.cgu.edu/web/writing-rhetoric.

Library: The Claremont Colleges Library has a wealth of resources, including subject specialist librarians, to support your academic work. Use the library for class work and research to access and use data-bases for articles, books, and data sets, to understand how to conduct effective searches and evaluate sources, use digital tools, and much more. The library offers workshops and 1-1 consultations with students as well. Website: https://library.claremont.edu/.

Course Generative Artificial Intelligence (GAI) Policy[3]

We are entering a new technological era with the rise of GAI, such as ChatGPT and other large language models, that are driving an ongoing conversation about their academic uses. We are also learning about the potential benefits and misuse of GAI and how it can be applied in the classroom. Learning to use generative GAI is a skill, however, we must use GAI tools effectively and responsibly. Here are the outlined the expectations in our classroom of its permitted and prohibited use.

- Permitted:
  - A student types a prompt into an GAI tool and reviews the generated content to help them study for a quiz or exam.
  - A student types a prompt into an GAI tool and uses the generated content to help them brainstorm ideas for a term paper or research project.
  - A student types a prompt into an GAI tool and uses the generated content to help them create a citation for a source and/or reference list.
  - A student types a prompt into an GAI tool and uses the generated content to help them with small group discussion.

Citing GAI and verifying its accuracy: By submitting work for evaluation in this course, you represent it as your own intellectual product. If you include content (e.g., ideas, text, code, images) that was generated, in whole or in part, by generative AI tools (including, but not limited to, ChatGPT and other large language models) in work submitted for evaluation in this course, **you must document and credit your source**. Material generated using other tools should be cited accordingly.

If you include material generated by a GAI tool and it is substantively incorrect you will lose points as appropriate. **You should verify the accuracy of all content you include in your work.**

- Prohibited:
  - Copying and pasting all or part of generated content without proper attribution to the GAI tool. If you copy anything from a generative AI tool, you absolutely must cite it. Otherwise this is in direct violation of the Code of Academic Integrity.
  - While taking an out-of-class ("take-home") or an in-class quiz, a student types a prompt into a generative AI tool and incorporates some or all of the generated content into their submitted answer.
- Be aware of the limits of GAI. Generative AI is a tool, but you need to cite it when you use it. Always. No exception. And you are prohibited from using it as stated above. Here are some cautionary points regarding the usage of GAI

[3]Special thanks to Tanu Kumar and Michael Hankinson for sharing this material.

- It may stifle your own independent thinking, creativity, and understanding of class concepts. Minimum effort into both generative AI prompts and your assignments will produce low quality results. Effectively and correctly using AI in academic work takes time and effort.
- Don't trust anything or everything AI says. If it gives you a number or fact, assume it is wrong unless you either know the answer or can check it with another non-AI source. This is an opportunity for you to practice your critical analysis skills. As noted above, you will be responsible for any errors of omissions provided by the tool.

Course Road-Map

1. Week 1 (8/28): Introduction to the Course Syllabus & Canvas

1. Establishing the "Common Language": Foundational Concepts & Setting Definitions

2. Week 2 (9/4): Setting the Stage: what do we mean by the "scientific" study of politics? Importance of Datasets & Defining Units of Analysis

    ⋆ TCD: **Chapter 1 (Thinking Clearly in a Data-Driven Age)**

    ⋆ FPSR: **Chapters 1 (The Scientific Study of Politics) & 2 (The Art of Theory Building)**

    ⋆ ***Highly* Recommended on General Advice, but not required:** King, Keohane, & Verba's *Designing Social Inquiry: Scientific Inference in Qualitative Research*. Cambridge University Press. 1994. **Chapters 1 (The *Science* in Social Science), 2 (Descriptive Inference) & 3 (Causality & Causal Inference)**

    ⋆ ***Highly* Recommended on General Advice, but not required:** Ismay & Kim's *Statistical Inference via Data Science: A ModernDrive into R and the Tidyverse*. Chapman & Hall/CRC. 2018. **Chapter 11 (Tell Your Story with Data)**

    ⋆ ***Recommended on General Advice, but not required:*** King, Keohane, & Verba's *Designing Social Inquiry: Scientific Inference in Qualitative Research*. Cambridge University Press. 1994. **Chapter 5 (Understanding What to Avoid)**

Week 3 (9/11): No class due to 2025 American Political Science Association (APSA) Annual Meeting in Vancouver, BC

3. Week 4 (9/18): Defining Correlation: Defining Correlation, Limitations, & Descriptive Inference

    ⋆ TCD: **Chapter 2 (Correlation: What Is it and What Is It Good For?)**

4. Week 5 (9/25): Limits of Descriptive Analysis & The Importance of Causal Inference

    ⋆ TCD: **Chapter 3 (Causation: What Is it and What Is It Good For?)**

    ⋆ FPSR: **Chapter 3 (Evaluating Causal Relationships)**

    ⋆ Problem Set #1 Due

2. Describing Relationships: Importance of Variation, Samples, and Statistical Uncertainty

5. Week 6 (10/2): Importance of Variation, *Not* Selecting on the Dependent Variable

    ⋆ TCD: **Chapters 4 (Correlation Requires Variation) & Chapter 5 (Regression for Describing & Forecasting)**

    ⋆ Tufte, Edward. 1997. *Visual and Statistical Thinking: Displays of Evidence for Making Decisions.* Cheshire, CT: Graphics Press LLC.

6. Week 7 (10/9): Importance of Sample Selection, Uncertainty, & Statistical Inference

    ⋆ TCD: **Chapters 6 (Samples, Uncertainty, & Statistical Inference) & 7 (Under-Comparing, Under-Reporting)**

    ⋆ FPSR: **Chapter 7 (Probability & Statistical Inference)**

    ⋆ Problem Set #2 Due

7. Week 8 (10/16): External Validity & Case Selection Decisions in Research Design

    ⋆ TCD: **Chapter 8 (Reversion to the Mean)**

    ⋆ FPSR: **Chapter 4 (Research Design)**

    ⋆ Geddes, Barbara. 2003. *Paradigms & Sand Castles*. Ann Arbor, MI: University of Michigan Press. **Chapter 3: How the Cases You Choose Affect the Answers You Get: Selection Bias and Related Issues.**

    ⋆ Problem Set #3 Due

3. Establishing Causality

8. Week 9 (10/23): Counterfactuals, Confounders, & Endogenity

    ⋆ TCD: **Chapter 9 (Why Correlation Doesn't Imply Causation)**

    ⋆ Morgan, Steven L. & Christopher Winship. 2007. *Counterfactuals & Causal Inference: Methods and Principles for Social Science Research*. New York, NY: Cambridge University Press. **Chapter 1: Introduction & Chapter 2: The Counterfactual Model**

    ⋆ Problem Set #4 Due

9. Week 10 (10/30): Controlling for Confounders & Bias in "Selection on Observables" Designs

- ⋆ TCD: **Chapters 9 (Why Correlation Doesn't Imply Causation) & 10 (Controlling for Confounders)**

10. Week 11 (11/6): The "Gold Standard" of Causality: Lab & Natural Experiments

    - ⋆ TCD: **Chapter 11 (Randomized Experiments)**
    - ⋆ Sekhorn, Jasjeet & Rocio Titunik. 2012. "When Natural Experiments are Neither Natural nor Experiments." *American Political Science Review.*
    - ⋆ Problem Set #5 Due

11. Week 12 (11/13): Causality When Experiments are Not Feasible: Regression Discontinuity & Difference-in-Difference Designs

    - ⋆ TCD: **Chapters 12 (Regression Discontinuity Designs) & 13 (Difference-in-Differences Design)**
    - ⋆ Problem Set #6 Due

4. Importance of Measurement & Causal Mechanisms in Social Science Research

12. Week 13 (11/20): Measuring Treatments & Outcomes in Research Design

    - ⋆ TCD: **Chapter 16 (Measure Your Mission)**
    - ⋆ FPSR: **Chapter 5 (Measuring Concepts of Interest) & 6 (Getting to Know Your Data)**

Week 14 (11/27): No class due to Thanksgiving break

13. Week 15 (12/4): Identifying Causal Mechanisms & Final Word on Limits of Quantification

    - ⋆ TCD: **Chapter 14 (Assessing Causal Mechanisms) & 17 (On the Limits of Quantification)**
    - ⋆ ***Optional Extra Credit:*** Problem Set #7 Due

This syllabus was last updated on: August 18, 2025

Acknowledgments: This syllabus was developed, in part, based on sample syllabi and guidance from Tanu Kumar, Jeff Jenkins, and Chris Hare.