

PADP 8140: Advanced Quantitative Methods

Fall 2026

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University of Georgia

Course Information

Meeting time: Wednesdays, 3:55–6:45 PM

Location: Baldwin Hall, Room 101B

Office hours: Thursdays, 4:30–5:30 PM

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Course Description

This course provides graduate students with advanced training in quantitative methods for public administration and policy research, with emphasis on limited dependent variable models and causal inference strategies. The first half of the course covers maximum likelihood estimation and models for outcomes that violate the assumptions of ordinary least squares, including counts, proportions, censored outcomes, and selected samples. The second half turns to the design-based toolkit of modern causal inference: potential outcomes, directed acyclic graphs, experiments, and the major quasi-experimental research designs used in applied policy research.

All applications and exercises use R.

Course Materials

Required Texts

All three required texts are available free online, with all code in R.

- Huntington-Klein, Nick. *The Effect: An Introduction to Research Design and Causality*. Chapman & Hall/CRC. Available at <https://theeffectbook.net>. [HK]
- Cunningham, Scott. *Causal Inference: The Mixtape*. Yale University Press. Available at <https://mixtape.scunning.com>. [CM]
- Roback, Paul and Julie Legler. *Beyond Multiple Linear Regression: Applied Generalized Linear Models and Multilevel Models in R*. CRC Press. Available at <https://bookdown.org/roback/bookdown-BeyondMLR/>. [RL]

Recommended Texts

- Long, J. Scott. *Regression Models for Categorical and Limited Dependent Variables*. Sage. The standard doctoral-level reference for the models covered in Weeks 1–3, including full treatments of tobit and sample selection. Not required, but worth owning if these models will appear in your dissertation.

Selected Articles

Article readings for the modern difference-in-differences session:

- Roth, Jonathan, Pedro H.C. Sant’Anna, Alyssa Bilinski, and John Poe. 2023. “What’s Trending in Difference-in-Differences? A Synthesis of the Recent Econometrics Literature.” *Journal of Econometrics* 235(2): 2218–2244.
- Goodman-Bacon, Andrew. 2021. “Difference-in-Differences with Variation in Treatment Timing.” *Journal of Econometrics* 225(2): 254–277.
- Callaway, Brantly and Pedro H.C. Sant’Anna. 2021. “Difference-in-Differences with Multiple Time Periods.” *Journal of Econometrics* 225(2): 200–230.

Software

We will use R and RStudio throughout the course. Both are free. Students should install both before the first class meeting. Homework must be submitted as a knitted R Markdown or Quarto document.

No prior R experience is assumed. Many of you have trained primarily in Stata; this course treats R as a translation exercise rather than a fresh start, and both causal inference texts present their code in Stata and R side by side. Three supports are built in:

- **Problem Set 0** (ungraded, required, due August 26): install R and RStudio, render a provided document, and complete a short Stata-to-R translation drill covering commands you already know.
- **In-class R workshops**: the final 40 minutes of each meeting during Weeks 1–5 are hands-on coding sessions applying that week’s estimator. Bring a laptop.
- **A Stata-to-R crosswalk** handout mapping the Stata commands used in your previous coursework to their R equivalents, distributed on the first day.

For general reference, see Wickham, Çetinkaya-Rundel, and Grolemund, *R for Data Science* (2nd ed.), free at <https://r4ds.hadley.nz>.

Grading

Component	Weight
Homework (6 problem sets)	30%
Midterm Exam	30%
Final Paper	40%

Homework

Six problem sets combining analytical questions and applied data analysis in R, together covering every method in the course — through the modern difference-in-differences estimators, synthetic controls, instrumental variables, and regression discontinuity designs. Problem sets are due at the start of class on the dates listed in the course schedule. Late homework loses one letter grade per day. In addition, Problem Set 0 (an ungraded R setup and Stata-to-R translation exercise) is required and must be completed by the second class meeting; graded problem sets will not be accepted from students who have not submitted it.

Midterm Exam

An in-class exam on Wednesday, October 7 covering maximum likelihood estimation and limited dependent variable models (Weeks 1–3) along with the foundations of causal inference, experiments, and regression-based identification (Weeks 4–7).

Final Paper

An original empirical research paper applying one or more of the causal inference designs covered in the second half of the course to a question in public administration or public policy. A one-page proposal is due Wednesday, November 4. We will workshop draft designs during the final class meeting. Papers are due Wednesday, December 9 at 5:00 PM.

Course Schedule

Date	Topic	Readings and Deliverables
Aug 19	Course overview; review of maximum likelihood estimation; R orientation	RL Ch. 2; PS 0 released
Aug 26	GLMs for limited dependent variables: counts and proportions	RL Ch. 4, 6; PS 0 due
Sep 2	Censoring and selection: tobit, survival models, and Heckman selection	Instructor notes; HW 1 due
Sep 9	Foundations of causal inference: potential outcomes and DAGs	HK Ch. 6–8; CM Ch. 3–4

Date	Topic	Readings and Deliverables
Sep 16	DAGs continued; identification and re-search design	HK Ch. 5, 9–10; HW 2 due
Sep 23	Experiments	CM Ch. 4 (revisit); instructor notes
Sep 30	Selection on observables I: regression	HK Ch. 13; HW 3 due
Oct 7	Midterm Exam	
Oct 14	Selection on observables II: matching and weighting	HK Ch. 14; CM Ch. 5
Oct 21	Fixed effects and the canonical difference-in-differences	HK Ch. 16, 18; CM Ch. 8–9
Oct 28	Difference-in-differences II: staggered adoption and modern estimators	Roth et al. (2023); Goodman-Bacon (2021); Callaway and Sant’Anna (2021); HW 4 due
Nov 4	Synthetic controls	CM Ch. 10; paper proposal due
Nov 11	Selection on unobservables I: instrumental variables	HK Ch. 19; CM Ch. 7; HW 5 due
Nov 18	Selection on unobservables II: regression discontinuity designs	HK Ch. 20; CM Ch. 6; HW 6 released
Dec 1*	Final paper workshop	HW 6 due

*Tuesday, December 1 operates on a Wednesday/Friday class schedule per the UGA academic calendar. Confirm with the instructor whether this session will meet.

Important University Dates

Classes begin	Monday, August 17
Drop/add period	August 17–21
Labor Day (no classes)	Monday, September 7
Fall break (no classes)	Friday, October 30
Withdrawal deadline	Wednesday, November 11
Thanksgiving break (no classes)	November 23–27
Classes end	Tuesday, December 1
Final exams	December 3–9

Course Policies

Academic Honesty

As a University of Georgia student, you have agreed to abide by the University's academic honesty policy, "A Culture of Honesty," and the Student Honor Code. All academic work must meet the standards described in "A Culture of Honesty" found at <https://honesty.uga.edu>. Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Questions related to course assignments and the academic honesty policy should be directed to the instructor.

Collaboration

Students may discuss homework problems with classmates, but each student must write up and submit their own solutions and code. The midterm and final paper must be completed independently.

Accommodations

Students who require accommodations should contact the Disability Resource Center (<https://drc.uga.edu>) and provide documentation to the instructor as early in the semester as possible.

Mental Health and Wellness

UGA has resources to support student wellbeing, including the University Health Center and Counseling and Psychiatric Services (CAPS). Students experiencing personal difficulties are encouraged to reach out; information is available at <https://well-being.uga.edu>.

Course Syllabus Disclaimer

The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.