

ECONOMETRICS AND CAUSAL INFERENCE FOR BUSINESS AND MANAGEMENT

Causal inference and empirical design for business and management research | Graduate level | 13 Weeks

Note: This is a sample syllabus designed for a teaching portfolio by Yuxuan Chen. Specific datasets, readings, software platforms, and assessment weights can be adapted to program level and departmental needs.

Level	graduate	Format	weekly lecture + tutorial
Prerequisites	undergraduate level statistics/econometrics	Software	STATA or R (Python optional)

Course Overview

This course trains graduate students in business and management to evaluate and design credible empirical research. Beginning with regression and potential outcomes, it develops modern strategies for credible counterfactual comparison: controls and fixed effects, matching, instrumental variables and shift-share designs, regression discontinuity, difference-in-differences, synthetic control, and analyses of heterogeneous effects and mechanisms. Emphasis is on identification, assumptions, diagnostics, interpretation, and research practice.

Learning Objectives

- Translate substantive business and management questions into potential outcomes and causal estimations.
- Diagnose selection, endogeneity, omitted-variable bias, and threats to identification.
- Implement and interpret major quasi-experimental designs and their diagnostic tests.
- Read empirical papers as research designs and develop a credible identification and replication workflow for an original question.

Teaching Approach

- Lecture (approximately 2 hours): concepts, assumptions, limited derivations, canonical designs, and coding demonstrations. “Lecture Anchor Readings” are discussed directly in class.
- Tutorial (approximately 1–1.5 hours): student-led identification audit and, where feasible, replication of a central result. Assessment: problem sets/coding 25%; tutorial memos/participation 20%; replication 20%; final research-design proposal 35%.

Texts and Reference Books

Primary Text: Hansen, B. E. (2022). *Econometrics*. Princeton University Press.

Applied Companion: Angrist, J. D., & Pischke, J.-S. (2009). *Mostly Harmless Econometrics: An Empiricist’s Companion*. Princeton University Press.

Causal Framework: Imbens, G. W., & Rubin, D. B. (2015). *Causal Inference for Statistics, Social, and Biomedical Sciences*. Cambridge University Press.

Graduate Reference: Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data* (2nd ed.). MIT Press.

Selected methodological articles and research papers listed below are required. Exact textbook chapters will be assigned with the weekly reading guide.

Indicative Assessment

Lab1 & Lab2	20%	Applied assignments	25%
Paper Presentation	10%	Group Final project	45%

Course Schedule

Week 1. Econometric Foundations and the Anatomy of an Empirical Paper

- Lecture: Probability/statistics review; OLS; omitted-variable bias; statistical inference; robust and clustered standard errors; association, prediction, and causal interpretation; reading regression tables.
- Tutorial: Dissect a conventional management paper to identify variables, controls, interactions, inference choices, and the limits of causal interpretation. **Reading:** Gruber, M., Dencker, J. C., & Nikiforou, A. (2024). How Founder Human Capital and Founding Conditions Shape New Firm Performance. *Academy of Management Journal*.

Week 2. Potential Outcomes and Causal Identification

- Lecture: Potential outcomes; $Y(1)$ and $Y(0)$; ATE and ATT; selection bias; SUTVA; random assignment; identification versus estimation; experiments as the causal benchmark.
- Tutorial: Reconstruct a randomized field experiment and connect treatment assignment to the missing counterfactual and heterogeneous effects. **Reading:** Dell'Acqua, F., et al. (2026). Navigating the Jagged Technological Frontier: Field Experimental Evidence of the Effects of Artificial Intelligence on Knowledge Worker Productivity and Quality. *Organization Science*.

Week 3. Selection on Observables, Controls, and Fixed Effects

- Lecture: Conditional independence; good and bad controls; post-treatment variables; panel data; firm, year, and industry-by-year fixed effects; within-unit identification; clustered inference.
- Tutorial: Trace how identification changes from pooled OLS to richer controls and firm fixed effects, and identify selection problems that remain. **Reading:** Lindbjerg, L., & Vlaschel, T. (2025). Hiring Entrepreneurs for Innovation. *Strategic Management Journal*.

Week 4. Matching, Weighting, and Selection on Observables

- Lecture: Self-selection; overlap; propensity scores; PSM; nearest-neighbor/KNN matching; coarsened exact matching; IPW; balance diagnostics; limitations under unobserved selection. **Reading:** Rosenbaum, P. R., & Rubin, D. B. (1983). The Central Role of the Propensity Score in Observational Studies for Causal Effects. *Biometrika*.
- Tutorial: Reconstruct matched-sample construction, balance tests, and the logic of combining matching with later panel identification. **Reading:** Odziemkowska, K., & Zhu, Y. (2025). How Social Movements Catalyze Firm Innovation. *Organization Science*.

Week 5. Instrumental Variables: Identification through Exogenous Variation

- Lecture: Endogeneity; relevance; exogeneity and exclusion; first stage, reduced form, and 2SLS; weak instruments; first-stage diagnostics; LATE and compliers; substantive defense of instruments. **Reading:** Angrist, J. D. (1990). Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records. *American Economic Review*; Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). The Colonial Origins of Comparative Development: An Empirical Investigation. *American Economic Review*.
- Tutorial: Identify the endogenous variable, instrument, first stage, exclusion restriction, and interpretation of the IV estimate in a recent institutional setting. **Reading:** Wang, S., & Yang, D. Y. (2025). Policy Experimentation in China: The Political Economy of Policy Learning. *Journal of Political Economy*.

Week 6. Bartik and Shift-Share Instrumental Variables

- Lecture: Shift-share construction; exposure shares and aggregate shocks; predetermined exposure; leave-one-out shocks; identifying variation; modern diagnostics; credibility of the exclusion restriction. **Reading:** Autor, D. H., Dorn, D., & Hanson, G. H. (2013). The China Syndrome: Local Labor Market Effects of Import Competition in the United States. *American Economic Review*.
- Tutorial: Compare a canonical trade-exposure instrument with a recent firm-level AI exposure design and evaluate whether identification comes from the shares, the shifts, or both. **Reading:** Alekseeva, L., Azar, J., Giné, M., & Samila, S. (2026). Artificial Intelligence Adoption and the Demand for Managerial Expertise. *Strategic Management Journal*.

Week 7. Regression Discontinuity Designs

- Lecture: Running variables and cutoffs; sharp and fuzzy RDD; local treatment effects; continuity; bandwidth; local polynomial estimation; manipulation, balance, placebo thresholds, and external validity. **Reading:** Imbens, G. W., & Lemieux, T. (2008). Regression Discontinuity Designs: A Guide to Practice. *Journal of Econometrics*.
- Tutorial: Assess an age-based historical RDD, including the threshold, local comparison, graphical evidence, window choice, alternative explanations, and complementary designs. **Reading:** Marquis, C., & Qiao, K. (2020). Waking from Mao's Dream: Communist Ideological Imprinting and the Internationalization of Entrepreneurial Ventures in China. *Administrative Science Quarterly*.

Week 8. Difference-in-Differences I: Basic Design and Matching + DiD

- Lecture: 2x2 DiD; ATT; parallel trends; TWFE representation; event-study intuition; anticipation; pre-trend diagnostics; placebo tests; serial correlation; matching + DiD. **Reading:** Card, D., & Krueger, A. B. (1994). Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania. *American Economic Review*.
- Tutorial: First reconstruct a contemporary Brexit DiD; then revisit matching to study why PSM and DiD address different sources of selection. **Reading:** Vanino, E., Douch, M., & Çakmak, İ. (2026). Political, Economic and Research Disintegration: The Impact of Geopolitical Uncertainty on Innovation and Cross-Border R&D Collaborations. *Research Policy*; Huang, K. G., Jia, N., & Ge, Y. (2024). Forced to Innovate? Consequences of United States' Anti-Dumping Sanctions on Innovations of Chinese Exporters. *Research Policy*.

Week 9. Difference-in-Differences II: Staggered Treatment

- Lecture: Variation in treatment timing; treatment-effect heterogeneity; problems with conventional TWFE; Goodman-Bacon intuition; group-time ATT; Callaway–Sant’Anna; cohort-specific and modern event-study estimates. **Reading:** Goodman-Bacon, A. (2021). Difference-in-Differences with Variation in Treatment Timing. *Journal of Econometrics*.
- Tutorial: Evaluate how a recent strategy paper addresses staggered treatment timing, dynamic effects, modern CSDID estimates, placebo tests, and synthetic-control robustness. **Reading:** Zhong, W., & Zheng, Y. (2025). Do Political Connections Stifle Firm Innovation? Natural Experimental Evidence from China’s Anti-Corruption Campaigns. *Strategic Management Journal*.

Week 10. Difference-in-Differences III: Treatment Intensity and Triple Differences

- Lecture: Continuous treatment and dose-response interpretation; intensity $\times$ post specifications; parallel trends across exposure levels; triple differences; third comparison dimensions; interpreting triple interactions. **Reading:** Callaway, B., Goodman-Bacon, A., & Sant’Anna, P. H. C. Difference-in-Differences with a Continuous Treatment. *American Economic Review*, forthcoming; Chetty, R., Looney, A., & Kroft, K. (2009). Saliency and Taxation: Theory and Evidence. *American Economic Review*.
- Tutorial: Reconstruct an intensity-based historical DiD and discuss how additional comparison dimensions strengthen or alter causal interpretation. **Reading:** Bai, Y., & Jia, R. (2016). Elite Recruitment and Political Stability: The Impact of the Abolition of China’s Civil Service Exam. *Econometrica*.

Week 11. Synthetic Control Methods

- Lecture: Comparative case studies; donor pools; weighted counterfactuals; predictor balance and pre-treatment fit; placebo units/dates; RMSPE; comparison with DiD; generalized synthetic-control intuition. **Reading:** Abadie, A., & Gardeazabal, J. (2003). The Economic Costs of Conflict: A Case Study of the Basque Country. *American Economic Review*.
- Tutorial: Construct the logic of a synthetic comparison unit and evaluate donor-pool choice, pre-treatment fit, post-treatment divergence, and placebo evidence. **Reading:** Li, X., Deng, Y., Manchanda, P., & De Reyck, B. (2026). Can Lower(ed) Expert Opinions Lead to Better Consumer Ratings? The Case of Michelin Stars. *Management Science*.

Week 12. Heterogeneous Effects, Moderation, and Causal Mechanisms

- Lecture: ATE versus heterogeneous effects; interaction terms and marginal effects; moderation; post-treatment variables; direct and indirect effects; causal mediation; sequential ignorability; mechanism evidence versus identified mediation. **Reading:** Imai, K., Keele, L., & Tingley, D. (2010). A General Approach to Causal Mediation Analysis. *Psychological Methods*.
- Tutorial: Use a randomized strategy intervention to distinguish average treatment effects, moderation, heterogeneous effects, and evidence about mechanisms. **Reading:** Novelli, E., & Spina, C. (2024). Making Business Model Decisions Like Scientists: Strategic Commitment, Uncertainty, and Economic Performance. *Strategic Management Journal*.

Final Project

Teams select a substantive business or management question and complete one end-to-end analysis. Projects may predict a business outcome with Lasso, Random Forest, or XGBoost; construct a text measure using TF-IDF, BERT, or an LLM; or develop a small RAG workflow for annual reports, disclosures, or other business documents. Deliverables include a concise research question, documented data, model choice, evaluation metrics, reproducible Python code, interpretation of results, and a short presentation.