Draft: September 4, 2024
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EDU S598: Design and Analysis of Field Experiments in Education

Fall Course: Mondays and Wednesdays from 8:30-10:00 am

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Office Hours: Make an appointment

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Office Hours: Wednesday, 12:30-2:00 (Make an appointment)

Course Description

You will learn how to plan, run, analyze, and interpret randomized field experiments in partnership with education practitioners. Basic knowledge of statistics, including regression analysis, is assumed.

- The first half of the course focuses on *research design* and *statistical analysis*. Students will learn the history, methodology, and theory of RCTs, conduct replications, and start their proposal for a field experiment.

- The second half of the course focuses on the *practicalities of field research*: establishing and sustaining research partnerships, IRB training, memoranda of understanding, data use agreements, and the use of administrative data. Students will work on these practical skills as they continue to draft and revise their proposal for a field experiment.

The second half of the course meets jointly with S582: Research Partnerships for Improving Education (syllabus appended), a class for master's students planning careers in education policy and practice. Frequent guest speakers (from think tanks, agencies, and universities) will share their experiences in research partnerships. The aim of learning *together* is for academic researchers and education practitioners to better understand each other's vocabularies, incentives, and goals, thereby strengthening their capacity to build productive research partnerships.

Prerequisites

The course is designed for doctoral students in education, public policy, economics, sociology, public health, political science, business, and related fields. You must be familiar with regression analysis and comfortable with interpreting confidence intervals, standard errors, t-tests, and p-values. You should be ready to program in a statistical language such as Stata or R (we will support Stata).

While this is sufficient preparation to *get started* in the class, you will need additional statistical training to conduct, plan and analyze your own randomized trials. Concurrent or future coursework in intermediate statistics, program evaluation, and/or econometrics is therefore expected.

Course Expectations and Evaluation

Attendance and Participation
You will attend and prepare for class. You will participate in class discussions thoughtfully and respectfully.

Weekly Exercises and Reading Responses
You will read articles and watch videos about randomized trials and research partnerships, as well as complete online training in data privacy and research ethics. You will use Stata to randomize, conduct balance checks, estimate treatment effects, run robustness checks, and generate professional tables and figures.

Replication
You will replicate the main results of a published randomized trial. This will be completed as short, weekly empirical analyses (as described above) and then collated into a polished replication.

Original Research Proposal
By the end of the class, you will have produced a detailed proposal (~15 pages) for a randomized trial. The proposal will include a short literature review, specific research questions, an analysis plan, proposed context and data sources, power calculations, and a project timeline. Assignments throughout the semester will move you toward completing this proposal. You will meet regularly with the teaching staff to get feedback and direction on your proposal.

Assignment	*Date*	*Weight*
Weekly analytic exercises and reading responses	Ongoing	20%
Participation	Ongoing	15%
Short descriptions of three proposed RCTs	Sept 20	5%
Completed replication of RCT	Oct 18	15%
Power calculation for proposed RCT	Oct 25	15%
Draft proposal	Nov 08	10%
Full proposal	Dec 06	20%

Assignment	*Available on Canvas*	*Due*
3 RCT Ideas / Exercise # 1 (randomize)	Sept 6/Sept 13	Sept 20
Exercise # 2 (power analysis)	Sept 20	Sept 27
Exercise # 3 (balance table)	Sept 27	Oct 4
Exercise # 4 (treatment effect)	Oct 4	Oct 11
Full Replication	Oct 4	Oct 18
Power Calculation for Proposed RCT	Oct 4	Oct 25
Draft Proposal	Oct 4	Nov 08
Full Proposal	Oct 25	Dec 06

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Course Outline and Readings

WEEK 1

- The experimental ideal
- Potential outcomes framework
- Selection bias and how randomization addresses it

Sept 3 & 4

1. Angrist, Joshua D., and Jörn-Steffen Pischke. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton university press, 2009. Chapters 1-2.
2. Krueger, Alan B. "Experimental Estimates of Education Production Functions." *The Quarterly Journal of Economics* 114:2 (1999): 497-532. Skim the technical bits; we will return to them later in the course.
3. Esther Duflo, 'Social Experiments to Fight Poverty': https://youtu.be/0zvrGiPkVcs

WEEK 2

- Treatment Effects – ATE, TOT, ITT, LATE
- Cluster RCTs – capturing spillovers

Sept 9

Bettinger, Eric P., and Brent J. Evans. "College guidance for all: A randomized experiment in pre-college advising." *Journal of Policy Analysis and Management* 38.3 (2019): 579-599.

Sept 11

Angrist, Joshua D., and Jörn-Steffen Pischke. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton university press, 2009. Chapter 4 (4.1, 4.1.1, 4.4.1, 4.4.3)

WEEK 3

- When and how to randomize; at what level to randomize
- Types of randomization: simple, stratified, pairwise

Sept 16

Glennerster, Rachel, and Kudzai Takavarasha. *Running Randomized Evaluations: A Practical Guide*. Princeton University Press, 2014. Chapter 4 (4.1, 4.2, 4.3, 4.5, 4.6 pages 161-165).

Sept 18

1. Duflo, Esther, Pascaline Dupas, and Michael Kremer. "School governance, teacher incentives, and pupil–teacher ratios: Experimental evidence from Kenyan primary schools." *Journal of Public Economics* 123 (2015): 92-110.
2. Dynarski, Susan, et al. "Closing the gap: The effect of reducing complexity and uncertainty in college pricing on the choices of low-income students." *American Economic Review* 111.6 (2021): 1721-56.

WEEK 4

- Power and precision: power, sample size calculation, improving power
- Measuring outcomes

Sept 23

1. Glennerster, Rachel, and Kudzai Takavarasha. *Running Randomized Evaluations: A Practical Guide*. Princeton University Press, 2014. Chapter 5 (5.1 & 5.2) and Chapter 6 (6.1 & 6.4).
2. https://www.povertyactionlab.org/resource/power-calculations

Sept 25

Ashraf, Nava, et al. "Negotiating a better future: How interpersonal skills facilitate intergenerational investment." *The Quarterly Journal of Economics* 135.2 (2020): 1095-1151.

WEEK 5

- Estimating treatment effects for individual and cluster RCTs
- Heterogeneity
- Multiple hypothesis testing.

Sept 30

1. Alan, Sule, Teodora Boneva, and Seda Ertac. "Ever failed, try again, succeed better: Results from a randomized educational intervention on grit." *The Quarterly Journal of Economics* 134.3 (2019): 1121-1162.
2. https://www.povertyactionlab.org/resource/data-analysis
3. Pre-analysis plan for Alan et. al (2019): https://www.socialscienceregistry.org/trials/3317

Oct 2 Guest Visit, Alejandro Ganimian)

Muralidharan, Karthik, Abhijeet Singh, and Alejandro J. Ganimian. "Disrupting education? Experimental evidence on technology-aided instruction in India." *American Economic Review* 109.4 (2019): 1426-1460.

WEEK 6

- Inference: robust standard errors, clustered standard errors, bootstrap, randomization inference
- Threats: attrition, sample selection bias, contamination
- Mop up; challenges & opportunities of conducting RCT research for PhD students

Oct 7

1. Glennerster, Rachel, and Kudzai Takavarasha. *Running Randomized Evaluations: A Practical Guide*. Princeton University Press, 2014. Chapter 7
2. Papay, John P., et al. "Learning job skills from colleagues at work: Evidence from a field experiment using teacher performance data." *American Economic Journal: Economic Policy* 12.1 (2020): 359-388.
3. https://www.povertyactionlab.org/resource/data-analysis

Oct 9, Guest Visit, Vesall Nourani

1. Ashraf, Nava, Abhijit Banerjee, and Vesall Nourani. "Learning to teach by learning to learn." *Ms., University of Chicago and Makerere University* (2021).

WEEK 7

- For Oct 16 forward, refer to S582: Research Partnerships for Improving Education syllabus for class schedule and assignments

Oct 14

No Class, *Indigenous Peoples' Day*

Oct 16

Begin meeting with S582

Academic Integrity

HGSE is committed to cultivating and maintaining a learning environment characterized by high academic standards and integrity. It is important for students to be familiar with expectations for academic work and to conduct themselves as academic professionals throughout their time and experiences at HGSE.

All work submitted to meet course requirements is expected to be the student's own. In the preparation of all assignments -- including written assignments, oral and/or visual presentations, or any other form submitted to meet course and degree requirements – students must distinguish between ideas that are their own and those that have been derived from other sources.

Information and opinions drawn from all sources must be attributed specifically to these sources. It is the student's responsibility to learn and use the proper forms of citation. In written assignments, quotations must be properly placed within quotation marks and must be fully cited. All paraphrased material must also be fully cited. In all cases where ideas or material presented are derived from a student's reading and research, the source used must be indicated. Students who submit work either not their own or without clear attribution to the original source, for whatever reason, face sanctions up to and including dismissal and expulsion.

Unless otherwise specified by your instructor, it is a violation of the HGSE Academic Integrity Policy to use generative AI to create all or part of an assignment for a course (e.g., a paper, memo, presentation, or short response) and submit it as your own. If you use generative AI tools in other ways as you complete course assignments, including using them to improve the readability or language of your submission, you must acknowledge and document their use. In your assignment submission, include a statement explaining what tool(s) you used, prompts you provided (if applicable), and how you integrated the output into your work.

Accommodating Students with Disabilities

If you have a documented disability and believe you may require accommodations, please reach out to Shayna Kessel (shayna_kessel@gse.harvard.edu) or Kevin Boehm (kevin_boehm@gse.harvard.edu) in the Office of Student Affairs (OSA) to assess your accommodation needs and address any support you might need. You can also refer to the information on HGSE's website about Accommodations and Accessibility.

Please note that the Office of Student Affairs (OSA) also offers assistance for students facing stress, anxiety, or other challenges