**Experimental Research: Design, Analysis, and Interpretation**

**(Quantitative Methods 3)**

W4768

Fall 2020

MW 4:10-5:25 (Online)

Professor Donald Green

Office hours: Wednesdays 1:30-3:30 (via Zoom)

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Section time: TBD

Course overview: In this course, we will discuss the logic of experimentation, its strengths and weaknesses compared to other research methods, and the ways in which experimentation has been -- and could be -- used to investigate social phenomena. Students will learn how to interpret, design, and execute experiments. Special attention will be devoted to field experiments, or randomized trials conducted in real-world settings.

Prerequisites: Students should have taken at least one or two semesters of statistics. Some understanding of probability, hypothesis testing, and regression are assumed. Familiarity with statistical software such as R is helpful. We will be working with data in class throughout the term. The examples used in the textbook and lectures are written in R, and R tutorials will be taught in special sessions early in the term. The Courseworks/Canvas site has an extensive library of example programs, datasets, and tutorials.

Readings: Students are expected to keep up with each week’s reading. The primary text for the course is

Gerber, Alan S., and Donald P. Green. 2012. *Field Experiments: Design, Analysis, and Interpretation*. New York: W.W. Norton.

The abbreviation for the book is FEDAI. The repository with replication data, programs, and errata is <http://isps.yale.edu/FEDAI>

Supplementary articles and unpublished papers are available on-line on the Courseworks/Canvas site. These works are designed to illustrate the design and implementation of field, lab, and survey experiments. I am happy to recommend other source material, some of which is in the Courseworks folder.

Assignments: Students are expected to complete weekly problem sets based on exercises from the FEDAI textbook. These problem sets are time-consuming, and students are encouraged to work in groups with the proviso that each student should compose his/her own answers.

Weekly TA sessions will focus primarily on computer work and issues related to the problem sets. We will try to find a meeting time that fits most students’ schedules.

Midway through the term, students will be asked to design and conduct a small experiment *not* involving human subjects and to describe the design and results in a 750 word essay. This assignment is typically at approximately the same time that we complete Chapter 5. When conducting this experiment, students will log their data, materials, and analyses using the Open Science Framework. Sign up for a (free) account at <https://osf.io>.

At the end of the term, students will be asked to compose a 1,500 word essay describing an attempt to reproduce and extend the analysis of an existing field experiment. (Each student will sign up to analyze a different study.) Replication projects should be turned in on the day of the final exam. When conducting this replication, students will log their data, materials, and analyses using the Open Science Framework.

We will have a midterm after Chapter 6 and a final exam during exam period. The final grade is based on the problem sets (30%), practicum experiment (10%), midterm (15%), replication project (20%), and final exam (25%).

Students who intend to take this course for “R” credit are expected to (1) attend all lectures, (2) turn in either a practicum experiment or a replication study, and (3) satisfactorily complete an end-of-term homework assignment that will be a compilation of various weekly homework problems.

The planned schedule of the course is as follows. Adjustments may be made based on student interest and discussion.

Apart from the FEDAI reading, the readings below are optional (but recommended).

**Week 1**. What are experiments? Why conduct experimental research?

FEDAI: Chapter 1.

My prejudices are spelled out here:

Gerber, Alan S., Donald P. Green, and Edward H. Kaplan. 2004. The Illusion of Learning from Observational Research. In Ian Shapiro, Rogers Smith, and Tarek Massoud, eds., *Problems and Methods in the Study of Politics*. New York: Cambridge University Press, pp. 251-73. The core theorem of the paper also provides the analytic underpinnings for the meta-analysis discussion (Chapter 11) in FEDAI.

**Week 2**. Experiments and Models of Potential Outcomes

FEDAI: Chapter 2. In addition, these research articles highlight the role that core assumptions play in experiment-based inference.

Page, Stewart. 1998. Accepting the Gay Person: Rental Accommodation in the Community, *Journal of Homosexuality*, 36 (2): 31-39. To what extent does this experiment isolate anti-gay housing discrimination? Note the conceptual error in the way that the results are percentaged.

Sherman, Lawrence W., and Dennis P. Rogan. 1995. Deterrent Effects of Police Raids on Crack Houses: A Randomized, Controlled Experiment. *Justice Quarterly* 12(4): 755-781. Note the subtle excludability violation due to the asymmetrical manner in which outcomes are measured in the treatment and control conditions.

**Week 3**. Sampling distributions and Randomization Inference

FEDAI: Chapter 3.

**Week 4**. Blocking and Covariate Adjustment

FEDAI: Chapter 4. In addition, the following article illustrates the analysis of blocked experiments and will also be discussed in Chapter 12.

Bertrand, Marianne and Sendhil Mullanathan. 2004. Are Emily and Greg More Employable than Lakisha and Jamil? A Field Experiment on Labor Market Discrimination. *American Economic Review*  94(4): 991-1013. Note how controlling for firm (the blocking unit) improves the precision with which the treatment effect is estimated.

**Week 5**. Field Experiments with One-sided Noncompliance (Failure-to-Treat)

FEDAI: Chapter 5. In addition, take a look at the following article, which we will use in class to illustrate the analysis of experiments with one-sided noncompliance.

Gerber, Alan S., and Donald P. Green. 2000. The Effects of Canvassing, Direct Mail, and Telephone Contact on Voter Turnout: A Field Experiment. *American Political Science Review* 94:653-63.

**Week 6**. Field Experiments with Two-sided Noncompliance (Encouragement Designs)

FEDAI: Chapter 6. In addition, read the following article, which we will use in class to illustrate the analysis of experiments with two-sided noncompliance.

Clingingsmith, David, Asim Ijaz Khwaja, and Michael Kremer. 2009. “Estimating the Impact of the Hajj: Religion and Tolerance in Islam’s Global Gathering.” *Quarterly Journal of Economics* 124: 1133-70.

**Week 7**. Attrition

FEDAI: Chapter 7. In addition, read the following article, which illustrates the uncertainty that attrition creates. The article also illustrates some potential modeling and bounding approaches.

Angrist, Joshua, Eric Bettinger, and Michael Kremer. 2006. “Long-Term Educational Consequences of Secondary School Vouchers: Evidence from Administrative Records in Colombia.” *American Economic Review* 96:847-862.

**Week 8**. Interference between Experimental Units

FEDAI: Chapter 8. In addition, read the following article, which illustrates a design and modeling approach to household and neighborhood spillover.

Sinclair, Betsy, Margaret McConnell, and Donald P. Green. 2012. “Detecting Social Networks: Design and Analysis of Multi-level Experiments.” *American Journal of Political Science* 56: 1055-1069.

**Week 9**. Heterogeneous Treatment Effects

FEDAI: Chapter 9. In addition, read the following article, which discusses how machine learning techniques can be used to automate the search for interactions.

Green, Donald P., and Holger Kern. 2012. “Modeling Heterogeneous Treatment Effects in Large-Scale Experiments Using Bayesian Additive Regression Trees.” *Public Opinion Quarterly* 76: 491-511.

**Week 10**. Mediation and Causal Mechanisms

FEDAI: Chapter 10. In addition, read the Ludwig et al. article, which suggests ways of assessing causal mechanisms short of full-blown social experiments. The Gerber et al. essay gives a sense of what “implicit mediation” looks like in practice.

Ludwig, Jens, Jeffrey R. Kling, and Sendhil Mullainathan. 2011. Mechanism Experiments and Policy Evaluations. *Journal of Economic Perspectives* 25(3): 17-38.

Gerber, Alan S., Green, Donald P. and Chris W. Larimer. 2008. Social Pressure and Voter Turnout: Evidence From a Large Scale Field Experiment. *American Political Science Review* 102(1):33-48.

**Week 11**. Models and Meta-Analysis

FEDAI: Chapter 11. In addition, read the following articles that suggest that caution in warranted when assessing conclusions reported in print.

Hill, Russell A., and Robert A. Barton. 2005. Red Enhances Human Performance in Contests. *Nature* 435 (19 May): 293.

Gerber, Alan S. and Neil Malhotra. 2008. Do Statistical Reporting Standards Affect What is Published? Publication Bias in Two Leading Political Science Journals. *Quarterly Journal of Political Science* (3): 313-326.

**Week 12**. Conducting an Experiment and Reporting the Results

FEDAI: Chapter 13, and Appendix A and B

**Weeks 13 and reading week**. These weeks allow us a bit of cushion in the likely event that we need extra time for discussion or review.