Course Description and Objectives
The goal of this course is to provide students with an introduction to advanced empirical methods. We begin by discussing the strengths and limitations of multiple regression analysis and the relationship between regression and causal modeling. We then develop a sequence of extensions and alternatives, including: randomized trials, regression discontinuity, matching methods, difference-in-differences and panel data, and instrumental variables. We will learn both the techniques and how to apply them using large-scale data sets from domestic and international policy settings. Skills students will acquire in this course include: the capacity to reason causally and empirically, the ability critically to assess empirical work, knowledge of advanced quantitative tools, and experience in working with large data sets.

How this course relates to other courses
Advanced Empirical Methods is a course offered for students interested in developing quantitative skills and experience with data analysis. Statistics and multiple regression are prerequisites for this course. Depending on their interests, students may wish to take both this course and Estimating Impacts or just one of these courses. Estimating Impacts covers selected analytic and design issues that are relevant to program evaluation. Advanced Empirical Methods instead focuses on learning empirical techniques and working with large real-world data sets.

Grading
The course will be evaluated through five problem sets (10% each), two pop quizzes, and one larger take-home assignment (25%). All problem sets will make use of Stata, so please ensure you are familiar with how to access this program at NYU.

Course Structure
The class includes lectures, readings, and independent computer lab work. You are strongly encouraged to relate the general material of the course to your specific policy interests throughout the course. Class attendance is critical as interaction within the classroom is an essential aspect of this course and the learning process associated with it.
**Expectations**
Preparation before class: come prepared for each class having read the required material carefully. Given the nature of the material, you may find your first pass at a required article challenging; the first time through focus on the concepts and intuition (often found in the introduction).

Absenteeism, punctuality, and in-class conduct: You are expected to attend all classes, and arrive on time. Systematic tardiness, disruptive behavior (including side conversations, use of your cell phone, or using your computer for anything other than note taking) will negatively impact your grade. If you miss a class due to unavoidable circumstances, please contact another member of the class and ask him or her what was covered in class.

**Schedule**
- 3 September: Preliminaries and review
- 10 September: Introduction to causality
- 17 September: Randomized controlled trials: basics
- 25 September: Randomized controlled trials: advanced
- 1 October: Introduction to Stata and discussion of PS 1
- 8 October: Instrumental variables, a (re-)introduction, and **problem set 1 due**
- 15 October: Instrumental variables: advanced
- 22 October: Regression discontinuity, introduction, and OH for PS 2, 8.30 – 9.00 pm, after class
- 29 October: Regression discontinuity, advanced, and **problem set 2 due**
- 5 November: Matching, basics, and OH for PS 3, 8.30 – 9.00 pm, after class
- 12 November: Matching, advanced, and **problem set 3 due**
- 19 November: Difference-in-differences and OH for PS 4 8.30 – 9.00 pm, after class
- 26 November: No class - Thanksgiving
- 3 December: Take-home assignment and PS 5 discussion and **problem set 4 due**.
- 10 December: No class (Classes meet on a Monday schedule); **problem set 5 and replication assignments due**

**Note:** These due dates are tentative; they will be postponed if we have not covered the necessary material. Weekly office hours are 12.30 – 2.00 pm, by appointment, in 3004 Puck. The office hours listed above are special in- and after-class sessions that have been earmarked for the topics as indicated.

**Readings**
* denotes required, # denotes an advanced reading where you should only skim the non-technical portions.

**Topic 1: Causality and the Treatment Effect**


**Topic 2: Introduction to Randomized**

Cox, The Planning of Experiments, selected chapters (currently unavailable online; check the library if you are interested in this topic).

**Topic 3: Randomized Experiments, Advanced Issues**


**Topic 4: Instrumental Variables, A Re-Introduction**


**Topic 5: Instrumental Variables, Advanced Topics**
Imbens, Guido, and Jeffrey Wooldridge (2009), “Instrumental Variables with Treatment Effect Heterogeniety: Local Average Treatment Effects,” manuscript.

**Topic 6: Regression Discontinuity, Introduction**


**Topic 7: Regression Discontinuity, Advanced Topics**

**Topic 8: Matching, Introduction**
*Stuart, Elizabeth (2009), “Matching Methods for Causal Inference: A Review and a Look Forward,” manuscript, Department of Biostatistics, Johns Hopkins University


**Topic 9: Matching, Advanced Topics**
# Abadie, Alberto, and Guido Imbens, "Large Sample Properties of Matching Estimators for Average

# Matias Busso, John DiNardo, and Justin McCrary, "New Evidence on the Finite Sample Properties of Propensity Score Reweighting and Matching Estimators," manuscript.


Topic 10: Difference-in-Differences