Overview and Plan of the Course

James J. Heckman
University of Chicago

Econ 312, Spring 2023

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- **Instructor:** James J. Heckman
- **Lectures:** Tuesdays and Thursdays, 5:00pm – 6:20pm
- **Classroom:** Saieh Hall Room 146
- **Teaching Assistants:**
    - Deniz Dutz (ddutz@uchicago.edu)
    - Sofia Shchukina (sofiashchukina@uchicago.edu)
- **TA Session:** Friday, 3:30pm — 4:20pm, Saieh Room 146

*Office hours by appointment.

Course Description

This course examines how economists learn from data. We focus on the following topics:

- Counterfactuals and economic policy evaluation in economics and statistics

- Alternative modes of inference, understanding how economists approach causal questions (abduction, exploration and discovery)

- Using economics to synthesize and interpret data

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Goals of the Course

1. Understand that econometrics is a field rooted in economics. Econometrics is much more than statistics and much more than just hypothesis testing:

   a. Using economics to organize and interpret data and to motivate choices of estimators and testing procedures

   b. Using economics and data to address policy problems

      i. Different classes of policy problems pose different challenges

      ii. "Causal parameters" vs. "structural parameters": is there any useful distinction?

   c. Understand the consequences of how data are generated (sampling plans) and how to account for them

   d. Replicability and consilience are essential activities of economic science

   e. Alternative modes of inference: classical statistics and its limitations; Bayesian and likelihood alternatives; abduction.

2. Tools
   a. Economic models to organize and interpret evidence
   b. Comparison of estimation methods in the context of Generalized Roy Models and extensions:
      i. Structural methods
      ii. IV
      iii. Matching
      iv. Control functions
      v. Longitudinal data and difference-in-differences
      vi. Duration models

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Class Requirements

There will be a written exam assigned on April 17th and due April 24th. There will also be 5 problem sets that are due each week. They will be graded and count toward the final grade. The assignments will include analytical, free-response, and empirical questions. These questions will require the use of programming languages like Python, R, or MATLAB. Any programming language is accepted for the simulation exercises. If students have any questions on Problem Sets they should first ask the TA and only ask the professor if the TA is unable to help.

For the problem sets in Part A of the course, you may form groups of up to 3 people, maximum, with no exceptions. These study groups will be permanent for the rest of the course.

Class Requirements, Continued

Please enter your group into this Google sheet by Friday, March 24:

Link to Form Groups

Each week, please have (only) one of your group members upload their problem set to Canvas (no late submissions are accepted) before the deadline. Note that groups consisting of more than 3 members earn a mark of 0.

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Rules for submission:

- Include everyone's names in the submitted document.

- Unless specified, the deadline for each assignment is by Monday at 11:59pm.

- The documents containing the write-up (including but not limited to paragraph answers, equations, graphs, plots, diagrams, tables) must be in PDF format and you are strongly encouraged to use LaTeX to typeset your solutions. A collaborative platform like Overleaf would be useful.

- Please submit your code along with the write-up: both the source file(s) and the PDF version of the code if possible. Platforms like RMarkdown (for R), Jupyter (for Python and R) and MATLAB live scripts can be especially useful to include equations and text in Markdown cells alongside code blocks. The code should be well-formatted, with comments and well-labeled variable names as appropriate.

Your grade for part A of the course will depend on the problem sets (50%) and the take home exam (50%). Bonus points will be awarded for participation during class.

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Lecture Notes

- Lecture notes for each week will be posted on the Canvas site in advance of each lecture on the website. The handouts distill and complement the readings.

2023 Syllabus Topics

1. Learning from Data
2. Causality
   1. Abduction
   2. Replicability in Economics
3. Discrete Choice, Self-Selection and the Generalized Roy Model
4. Instrumental Variables
5. General Principles Underlying All Econometric Estimators
6. Matching
7. Simultaneous Equations and Social Interactions
8. Longitudinal and Panel Data

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