Objective
This course, intended for PhD students in economics, has one main goal (1) to develop both reduced form and structural modeling techniques commonly used within the more general field of microeconomics. It is an advanced level course and knowledge of game theory, calculus, microeconomics, and econometrics is required.

Throughout the course, there will be an emphasis on the thought process the authors went through in writing the papers. What are the goals of the paper? Why is the question/topic important? Is a non-structural method sufficient for answering the question? Why or why not? What benefits do more complicated structural models yield (in some contexts)? Is the model identified (apart from by functional form)? Are there features missing in the model that bias the findings?

A large part of the course will be discussion based. Therefore, it is important to read the required papers prior to class.

There will be several problem sets, which are designed to help students learn the empirical research methods. The problem sets may take ample time, so please do not wait until the last minute. Prior knowledge of STATA and MATLAB is strongly recommended.

Textbooks

Recommended Texts (purchasing is not necessary, but occasional access is)
Adda and Cooper: “Dynamic Economics: Quantitative Methods and Applications”


Course Requirements

Problem sets account for 100% of the grade.
In view of the limited class time and amount of material to be covered, students will be expected to undertake a substantial amount of work independently. However, class time will also be dedicated to review difficult concepts and provide feedback of problem sets in progress.

**Learning Goals**

There are two main learning goals. (1) Students should aim to be able to understand various empirical estimation models, the advantages of each, as well as their limitations. (2) Students should be able to successfully implement each method and code them into MATLAB/Python/STATA. The first goal is often necessary to understand others’ works, and perform refereeing duties. The latter goal is necessary to prepare students for their own applied research.

**Disability Information**

If you are a student with a documented disability at Brandeis University and if you wish to request a reasonable accommodation for this class please see me immediately. Please keep in mind that accommodations are not provided retroactively.

**Academic Honesty**

You are expected to be honest in all of your academic work. Potential sanctions include failure in the course and suspension from the university. If you have any questions about my expectations, please ask.

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### Topics and reading list:

**Lecture 1: First Day**
Overview of course, structural/non-structural models, identification

*Required Reading*

Lectures 2 and 3: Reduced Form Regression Techniques: Diff-in-Diff and Regression Discontinuity

Required Reading:


Lecture 4: Empirical Models of Differentiated Products 1

Required Reading

Train Chapter 3, through section 3.6.

Train Chapter 4, through section 4.2.

Lecture 5: Empirical Models of Differentiated Products 2

Required Reading

Ariel Pakes' public notes 1 on this topic
And public notes 2


The above readings summarize the much harder optional read: (Berry S., J. Levinson and A. Pakes, “Automobile Prices in Market Equilibrium,” Econometrica, 63(4), 1995). You do not have to read this paper.

Lecture 6: Empirical Models of Differentiated Products 3

Required Reading


Optional Reading


Lecture 7: Dynamic Models 1

Required Reading:

“Dynamic Economics: Quantitative Methods and Applications (Adda and Cooper)”, Chapters 1, 2 and 3.

Lecture 8: Dynamic Models 2

Required Reading:


Optional Reading


Lecture 9: Resale

*Required Reading*


Lecture 10: Web Scraping Data and Regular Expression

*Required Reading*
https://stats.idre.ucla.edu/stata/faq/how-can-i-extract-a-portion-of-a-string-variable-using-regular-expressions/

Lecture 11: Moment Inequalities and Machine Learning

*Required Reading:
Ariel Pakes’ notes on moment inequalities