UNIVERSITY of HOUSTON

# Empirical Industrial Organization

Spring Semester 2025

Tuesday-Thursday: 1:00 PM - 2:30 PM

CV N113

**Contact information**

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Office hours: By appointment only. Mostly on Tuesdays, check the online schedule.
You can schedule an appointment at http://www.uh.edu/~aszabo2/appointments.htm (24 hour notice required).

**Course Description**

This course provides a graduate-level introduction to empirical industrial organization, both in terms of techniques and applications. We will discuss leading papers in the field of empirical IO covering the estimation of several models and their applications. This class differs somewhat from the courses offered under the same class number in previous years.

1. Models of product differentiation.
We estimate demand systems for differentiated products, which gives us a framework to estimate own and cross price elasticities, estimate markups, measure market power, evaluate mergers, quantify the benefits of a new product, evaluate the effect of discontinuing a product, examine how information asymmetry (advertising) affects demand estimation and the resulting substitution patterns.

2. Single agent dynamic models, Dynamic games of imperfect competition.
We provide a framework to estimate discrete choice dynamic models. We start with the estimation of single agent dynamic models, such as the optimal investment model. Next, we study the estimation of multiplayer dynamic games. Our main focus is on models of firm entry and exit in oligopoly markets. We analyze industry pricing, industry performance, and optimal industry policy, and measure the welfare cost of government regulations.

3. Dynamic demand estimation, storable and durable goods.
This part of the class introduces recent advances in dynamic durable goods models and models of storable goods to study consumers' inventory behavior and intertemporal substitution.

4. Estimating production functions. We study recent advances in production function estimation techniques, which includes computing productivity and misallocation measures.

**Prerequisites**

Students are expected to have taken PhD level Microeconomic Theory and Econometrics classes. Students also need to have basic knowledge of dynamic optimization. Programming in STATA and MATLAB will be required to complete homework assignments.

**Textbook and software**

There is no specific textbook for this class. We will be using a combination of lecture notes and journal articles. The required articles are listed below.

You will be required to use STATA and MATLAB software packages. STATA is available for purchase at a discounted price and MATLAB is available for free for UH students.

Students should familiarize themselves with the software packages in order to program the homework exercises. Although we will briefly discuss how to implement specific estimation methods in MATLAB, the class does not provide an introduction to basic computer programming.

**Course Requirements**

The class schedule below contains the main papers we are going to discuss during each class. Students are expected to complete the assigned readings before attending class. For each topic, I will provide an overview of the literature, and we will discuss the assigned paper in detail. Depending on the class, we may spend more time on the overview and less on the details. Students are required to fully understand the assigned papers regardless of how much time we spend on them in class. All of these papers will be part of the exams.

The course has some difficult econometrics, and it is expected that students have a basic comfort level with estimation. It is also expected that students will do requisite background readings in econometric theory where necessary. This class will be rather demanding.

There will be 4 homework assignments and two exams. See below.

**Assignments and Grading**

The final grade is based on three homework exercises and two exams.

Please be prepared to work on these homeworks for several weeks. The due dates for homework assignments are listed in the class schedule.

The exams are worth 50% (25% each) and the homework assignments are worth 50% of your final grade. To receive any grade other than "F" or "Incomplete", a student is required to submit all assignments. There is no exception.

**Class Website**

All assignments and handouts will be posted on the class website in Canvas. Please do not email me homework files, upload everything on Canvas.

| Week | Class # | Date/Day | | | Topic | Problem Sets |
|---|---|---|---|---|---|---|
| **Week 1** | 1 | Jan | 14 | T | Welcome to IO! Syllabus, introduction | |
| **DIFFERENTIATED PRODUCTS** | | | | | | |
| | 2 | | 16 | Th | Berry, S., J. Levinsohn, and A. Pakes (1995): "Automobile Prices in Market Equilibrium," *Econometrica*, 63(4), 841-890. | |
| **Week 2** | 3 | | 21 | T | NO CLASS – UH CLOSED | |
| | 4 | | 23 | Th | *More on BLP* | |
| **Week 3** | 5 | | 28 | T | Nevo, A. (2001): "Measuring Market Power in the Ready-to-Eat Cereal Industry," *Econometrica,* 69, 307-342. | |
| | 6 | | 30 | Th | Nevo, A. (1998): "A Practitioner's Guide to Estimation of Random-Coefficients Logit Models of Demand," *Journal of Economics and Management Strategy,* 9(4), 513-548. | |
| **Week 4** | 7 | Febr | 4 | T | PS 1 Discussion | |
| | 8 | | 6 | Th | Petrin A. (2002): "Quantifying the Benefits of New Products: The Case of the Minivan", *Journal of Political Economy*, 110, 705-729. | |
| **Week 5** | 9 | | 11 | T | Goeree M. (2009): "Limited Information and Advertising in the U.S. Personal Computer Industry," *Econometrica*, 76(5), 1017–1074. | |
| **ESTIMATION OF DYNAMIC MODELS** | | | | | | |
| | 10 | | 13 | Th | Overview of dynamic programming. Value function. Markov Perfect Equilibrium.<br><br>Rust, J. (1987): "Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher," *Econometrica* 55(5), 999-1033. | PS 1 |
| **Week 6** | 11 | | 18 | T | Hotz, V. J. and R. A. Miller (1993): "Conditional Choice Probabilities and the Estimation of Dynamic Models," *Review of Economic Studies* 60(3), 497-529. | |
| | 12 | | 20 | Th | Bajari, P., L. Benkard and J. Levin (2007): "Estimating Dynamic Models of Imperfect Competition," *Econometrica* 75(5), 1331-70* | |
| **Week 7** | 13 | | 25 | T | Catch-up and PS 2 Discussion. | |

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| | 14 | | 27 | Th | S. P. Ryan (2012): "The Costs of Environmental Regulation in a Concentrated Industry," *Econometrica*, 80(3), 1019–1061* | |
| Week 8 | 15 | March | 4 | T | Bryan Bollinger, Naim Darghouth, Kenneth Gillingham and Andres Gonzalez-Lira (2025): Valuing Technology Complementarities: Rooftop Solar and Energy Storage, WP. | |
| | 16 | | 6 | Th | **Midterm I** | |
| **Week 9** | 17 | | 11 | T | **SPRING BREAK** | |
| | 18 | | 13 | Th | **SPRING BREAK** | |
| **DYNAMIC DEMAND** | | | | | | |
| **Week 10** | 19 | | 18 | T | Erdem, T., S. Imai and M. P. Keane (2003): "Brand Quantity Choice Dynamics Under Price Uncertainty," *Quantitative Marketing and Economics*, 1, 5-64.<br><br>Pesendorfer, M. (2002): "Retail Sales: A Study of Pricing Behavior in Supermarkets," *The Journal of Business,* 75, 33-66.<br><br>Pierre Dubois, Rachel Griffith and Martin O'Connell (2022): The Use of Scanner Data for Economics Research*, The Annual Review of Economics,* 14:723–45. | PS 2 |
| | 20 | | 20 | Th | Class on Sabine Cluster (https://uh.edu/rcdc/resources/hpc/sabine/) | |
| **Week 11** | 21 | | 25 | T | Hendel, I. and A. Nevo (2006): "Measuring the Implications of Sales and Consumer Inventory Behavior," *Econometrica*, 74(6), 1637-1673.* | |
| | 22 | | 27 | Th | Gowrisankaran, G. and M. Rysman (2012): "Dynamics of Consumer Demand for New Durable Goods, *Journal of Political Economy,* 120, 1173-1219.* | |
| **Week 12** | 23 | April | 1 | T | Current topics on dynamic demand estimation. | |
| | 24 | | 3 | Th | **NO CLASS** | |
| **Week 13** | 25 | | 8 | T | S. Olley and A. Pakes (1996): "The Dynamics of Productivity in the Telecommunications Equipment Industry," *Econometrica,* 64, 1263-98.* | |
| | 26 | | 10 | Th | A. Petrin and J. Levinsohn (2003): "Estimating Production Functions Using | PS 3 (upload paper) |

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| | | | | | Inputs to Control for Unobservables," *Review of Economic Studies*, 70(2), 317-342.*<br><br>Wooldridge, J. M. (2009): "On Estimating Firm-Level Production Functions Using Proxy Variables to Control for Unobservables," *Economics Letters* 104(3), 112-114.* | |
| **Week 14** | 27 | | 15 | T | Ackerberg, D. A., K. Caves, and G. Frazer (2015): "Identification Properties of Recent Production Function Estimators," *Econometrica*, 83(6), 2411-2451.<br><br>Gandhi, A., S. Navarro and D. Rivers (2020): "On the Identification of Gross Output Production Functions," *Journal of Political Economy 122(51), 1013-1063.*<br><br>Emmanuel Dhyne, Amil Petrin, Valerie Smeets, and Frederic Warzynski (2022): "Theory for Extending Single-Product Production Function Estimation to Multi-Product Settings", WP. | |
| | 28 | | 17 | Th | Current topics in IO<br>Job market papers from this year | |
| **Week 15** | 29 | | 22 | T | Current topics in IO<br>Job market papers from this year | PS 4 (production function estimation) |
| | 30 | | 24 | Th | **Midterm II** | |

***: required material**