ECO 310 H1S
EMPIRICAL INDUSTRIAL ORGANIZATION

DEPARTMENT OF ECONOMICS. UNIVERSITY OF TORONTO
Winter 2025

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Course Website in Quercus: https://q.utoronto.ca/courses/377550

- **Lectures:** Mondays 10:00 am – 12:00 pm. Classroom, Sidney Smith (SS) 1071
- **Tutorials:** Mondays 12:00 pm – 1:00 pm. Classroom, Sidney Smith (SS) 1071
- **Office Hours:** Tuesdays 2:00 – 4:00 pm. Max Gluskin House (GE), Office 309

A. COURSE DESCRIPTION

This course introduces students to Empirical Industrial Organization (IO), a field that examines the mechanics of markets, the dynamics of competition and collusion among firms, and the outcomes these interactions produce. Key outcomes include the variety, pricing, and quality of products, firm profitability, and consumer welfare. A defining feature of IO is its emphasis on the interdependence of firms' decisions within a market. When a firm designs a product, sets prices, chooses inputs, or determines production levels, it must anticipate how competitors will adjust their strategies in response. These interdependencies shape firms' decision-making and drive market competition.

Over the past two decades, IO research has become increasingly empirical, relying heavily on data about consumer and firm behavior. Economists use these data to estimate consumer demand and firms' costs and behavior, gaining insights into strategic behaviors and evaluating the effects of government policies on competition and social welfare. The rise of 'big data'—detailed, large-scale information on consumer and firm choices—has transformed the field, enabling new research questions and spurring the development of innovative models and methods.

Empirical IO emphasizes the integration of data, economic models, and econometric techniques to address real-world questions. Four foundational models guide much of the field's research: (1) Production functions and firm productivity assessment; (2) Demand models and the estimation of consumer preferences; (3) Price and quantity competition models; and (4) Market entry and innovation models, encompassing both static and dynamic perspectives. This course is structured around these core models, offering students a comprehensive understanding of their application.

Econometrics and data analysis are essential tools for modern economists, and they are central to this course. Students will learn standard econometric methods, including linear regression, instrumental variables estimation, and discrete choice models. Practical experience with economic data and the Stata statistical software package will further enhance their analytical skills.

B. COURSE OBJECTIVES

- By the end of this course, students will:

    1. Develop a solid understanding of key empirical models, including those addressing demand, production functions, price and quantity competition, and market entry.

    2. Comprehend endogeneity issues in simultaneous equations models, their implications, and approaches to resolving them.

    3. Gain proficiency in estimating model parameters using market data and interpreting the resulting economic insights.

    4. Acquire practical programming skills in Stata, along with hands-on experience working with real-world data, equipping them to undertake empirical research in industrial organization.

- Tutorials are a vital component of this course, providing essential training in programming and the analysis of market data. These sessions are designed not only to support students in completing assignments but also to prepare them for practical questions in the midterm and final exams. Active participation in all tutorials is a fundamental course requirement.

C. COURSE PREREQUISITES

- *Microeconomic Theory:* ECO200 Y1, or ECO204 Y1, or ECO206 Y1.
- *Quantitative Methods:* ECO220 Y1, or ECO227 Y1, or (STA237 H1 & STA238 H1), or (STA247 H1 & STA248 H1), or (STA257 H1 & STA261 H1).
- It is the student's responsibility to ensure s\he has met the prerequisites for this course.

D. RECOMMENDED COURSES (but not prerequisites)

- ECO380 H1: Markets, Competition, and Strategy. This course covers the theory of IO.
- Applied Econometrics: ECO372 H1, ECO375 H1, or equivalent.

E. CLASS MEETINGS

- **Lectures:** Mondays 10:00 am – 12:00 pm. Classroom, Sidney Smith (SS) 1071
- **Tutorials:** Mondays 12:00 pm – 1:00 pm. Classroom, Sidney Smith (SS) 1071
- Please, keep in mind the following **expectations**.

    1. **Missing a lecture** or tutorial without justification will be penalized with 3 percentage points from your maximum of 10 points from class participation. This does not mean that

attending a lecture –without active participation – grants you points in your class participation grade.

2. It is the Faculty's policy that students who miss classes, for legitimate reasons or otherwise, are responsible for making up the missed material and should not expect an instructor or TA to re-teach them the material.
3. Show up for classes **on time**, give your best effort to fully engage in learning activities.

F. EVALUATION

- Your final grade will be based on the evaluation of class participation, two problem sets, a midterm exam, and a final exam according to the following weighting:
  - Class Participation: 10%
  - First Problem set: 20%
  - Midterm Exam: 20%
  - Second Problem set: 20%
  - Final Exam: 30%

- ***Class Participation (10%).*** Your grade will be based on your active participation in class – asking and responding questions and engaging in discussions on the course material – and on (unannounced) in-class quizzes.

- ***Problem sets (40%).*** There will be two problem sets, each worth 20%. In these problem sets you will have to use the STATA software package.

  - Problem set 1 will be handed out on Monday, January 20 (it will be posted at the course website in Quercus) and it is **due before Monday, January 27, through Quercus before 11:59pm**.
  - Problem set 2 will be handed out on Monday, March 17 (it will be posted at the course website in Quercus) and it is **due before Monday, March 24, through Quercus before 11:59pm**.
  - Your answers to the problem sets should be typed and submitted in electronic version, preferably in PDF format.
  - Late Problem Sets will not be accepted and will receive a grade of zero.

- ***Midterm Exam (20%).*** Closed-Book exam, no aids allowed. The material covered in this Midterm Exam includes all the lectures and tutorials from Week 1 to Week 7, included. The duration of the exam is 1.5 hours. The exam will take place in class during lecture/tutorial time on **Monday, March 3**.

- ***Final Exam (30%).*** Closed-Book exam, no aids allowed. The material covered in this Final Exam includes all the lectures and tutorials from Week 1 to Week 12, included. The duration of the exam is 3 hours. The exam will take place **during the University Final Exam Period**. **Date, Time, and Location to Be Announced**.

G. MISSED DEADLINES

1. **Late Problem Sets**: Late submissions will not be accepted and will receive a grade of zero.
2. **Midterm Exam**:
    - There will be no make-up for the Midterm Exam. Students who miss the Midterm Exam without a valid reason will receive a grade of zero.
    - If the absence is due to illness or injury, students must notify the instructor by email (using their UofT email account) within 24 hours of the exam date. Normally, I will ask you for documentation in support of your specific medical circumstances. This documentation can be an Absence Declaration (via ACORN) or the University's Verification of Student Illness or Injury (VOI) form.
    - If I determine the reason to be valid, the weight of the midterm (20%) will be reallocated to the final exam.

H. ACADEMIC CONDUCT

All students, faculty and staff are expected to follow the University's guidelines and policies on academic integrity. For students, this means following the standards of academic honesty when writing assignments, collaborating with fellow students, and writing tests and exams. Ensure that the work you submit for grading represents your own honest efforts. Plagiarism—representing someone else's work as your own or submitting work that you have previously submitted for marks in another class or program—is a serious offence that can result in sanctions. Speak to me or your TA for advice on anything that you find unclear. To learn more about how to cite and use source material appropriately and for other writing support, see the U of T writing support website at http://www.writing.utoronto.ca. Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity and http://academicintegrity.utoronto.ca**.** All cases of suspected academic misconduct will be referred to the Dean's office.

I. USE OF ARTIFITIAL INTELLIGENCE TOOLS IN ASSIGNMENTS

Students may use artificial intelligence tools, including generative AI, in this course as learning aids or to help produce assignments. However, students are ultimately accountable for the work they submit. Students must submit, as an appendix with their assignments, a description of whether and how they have used artificial intelligence tools. The documentation should include what tool(s) were used, how they were used, and how the results from the AI were incorporated into the submitted work.

J. ACCESSIBILITY

Students with diverse learning styles and needs are welcome in this course. If you have an acute or ongoing disability issue or accommodation need, you should register with Accessibility Services (AS) at the beginning of the academic year by visiting http://www.studentlife.utoronto.ca/as/new-registration. Without registration, you will not be able to verify your situation with your instructors, and

instructors will not be advised about your accommodation needs. AS will assess your situation, develop an accommodation plan with you, and support you in requesting accommodation for your course work.

K. E-MAIL POLICY

Use e-mails for appointments, administrative matters, or urgent issues. Questions about the course material, lectures, and tutorials are more appropriate for office hours. I will normally reply to e-mails within 24 hours. You must use your UofT e-mail address and include the course number "ECO 310" in the subject line, otherwise your e-mail may be automatically quarantined as "junk e-mail".

L. TEST SCORE APPEALS

Please write a short paragraph explaining why you should obtain additional points. Turn in a hard copy of this by the end of the week following the week in which exams are first handed back. Your entire exam will then be re-graded, **and your score may go up or down**.

M. COURSE WEBSITE

The course website in Quercus is https://q.utoronto.ca/courses/377550. I will use the course website as a means of communication with the class, so I recommend you check the announcements regularly. In addition, I will periodically post the lecture slides online.

N. COURSE MATERIAL

- There is no textbook. The course is organized around a Book Project, four survey papers in Empirical IO and Structural Econometrics (see Main References below), and published articles on empirical applications. The lecture notes and the surveys are key references for this course.

- In addition, a useful supplemental econometrics reference is: *Jeffrey M. Wooldridge: "Introductory Econometrics: A Modern Approach", 4th Edition or later.*
  Although it is not required, this textbook is available for purchase at the U of T Bookstore. Free copies are available online.

- You are required to have access to the STATA software package. You can get a 6-month student license of STATA/BE for USD $48 through https://www.stata.com/order/new/edu/profplus/student-pricing/

- For the datasets that we will use in this course, the version STATA/BE should be sufficient.

O. MAIN REFERENCES

PDF copies of these references are available online in the course website.

- [ABBP] Ackerberg, D., L. Benkard, S. Berry, and A. Pakes (2006): "Econometric Tools for Analyzing Market Outcomes," *Handbook of Econometrics*, volume 6.
- [AG] Aguirregabiria, V. (2021): Book Project: "Empirical Industrial Organization: Models, Methods and Applications." Available at the course website.
- [ASL] Aguirregabiria, V., and M. Slade (2017): "Empirical Models of Firms and Industries," *Canadian Journal of Economics*, 50(5), 1445-1466.
- [BR] Berry, S., & Reiss, P. (2007): "Empirical Models of Entry and Market Structure," in *Handbook of Industrial Organization*, Volume 3, pp. 1845-1886.
- [NE] Nevo, A. (2011): "Empirical Models of Consumer Behavior," *Annual Review of Economics*, 3, 51-75.
- [RW] Reiss, P., and Wolak, F. (2007): "Structural Econometric Modeling: Rationales and Examples from Industrial Organization," in *Handbook of Econometrics*, Volume 6, pp. 4277-4415.

P. LIST OF TOPICS

1. Introduction to the Course.
2. Measuring Productivity. Estimation of Production Functions.
3. Measuring Consumer Preferences. Estimation of Demand of Differentiated Products
4. Competition in Prices and Quantities.
5. Empirical Models of Market Entry

Q. OUTLINE AND REFERENCES

1. Introduction to the Course

1.1. Measuring and explaining market power
1.2. Data in Empirical IO
1.3. Structural models in Empirical Industrial Organization: An Example
1.4. An overview of the rest of the course

Readings: [AG] Chapter 1. [RW] Sections 1 to 5.

2. Measuring Productivity. Estimation of Production Functions

2.1 Introduction
2.2. Simultaneity Problem
2.3 Dynamic Panel Data Methods
2.4. Control function methods
2.5. Application.

Readings: [AG] Chapter 3. [ASL] Section 4. [ABBP] Section 2.

- Griliches, Z., and J. Mairesse (1998): "Production Functions: The Search for Identification," in Econometrics and Economic Theory in the Twentieth Century.

3. Measuring Consumer Preferences. Estimation of Demand of Differentiated Products

3.1. Introduction
3.2. Demand systems in product space
3.3 Demand systems in characteristics space
3.4. Application

Readings: [AG] Chapter 2. [ASL] Section 2. [ABBP] Section 1.
[NE] whole paper. [RW] Section 7.

- Berry, S. (1994). "Estimating Discrete-Choice Models of Product Differentiation," *RAND Journal of Economics*, 25(2), 242-262.

4. Competition in Prices and Quantities

4.1. The Conjectural Variation Approach
4.2. Testing static oligopoly models (Genesove and Mullin: RAND 1998)
4.3. Nevo on Cereals (Nevo, 2001)

Readings: [AG] Chapter 4. [ASL] Section 3. [RW] Section 6.

- Genesove, D., and Mullin, W. (1998). "Testing static oligopoly models: Conduct and Cost in the Sugar Industry," RAND Journal of Economics, Vol. 29(2), pp. 355-377.
- Nevo, A. (2001): "Measuring Market Power in the Ready-to-Eat Cereal Industry," *Econometrica*, 69(2), 307-342.

5. Empirical Models of Market Entry

5.1. Some general ideas
5.2. Bresnahan and Reiss (JPE, 1991)
5.3. Empirical Models of Market Entry with Heterogeneous firms

Readings: [AG] Chapter 5. [BR] All sections. [RW] Section 10

- Bresnahan, T. and P. Reiss (1991): "Entry and Competition in Concentrated Markets," *Journal of Political Economy*, 95, 977-1009.

R. LECTURES, TUTORIALS & IMPORTANT DAYS

- **Week 1**. Monday, Jan. 6
  - Lecture 1. *Introduction to the course*
  - Tutorial 1. *Refreshing Econometrics*

- **Week 2**. Monday, Jan. 13
  - Lecture 2. *Measuring Firm Productivity – Intro, Model*
  - Tutorial 2. *Introduction to STATA*

- **Week 3**. Monday, Jan. 20
  - Lecture 3. *Measuring Firm Productivity – Econometric issues and methods*
  - Tutorial 3. *Estimating Production Functions in STATA*
  - ✓ **Monday, Jan. 20: Problem Set #1 is handed out**

- **Week 4**. Monday, Jan. 27
  - Lecture 4. *Measuring Firm Productivity – Empirical applications*
  - Tutorial 4. *Solution to previous years' problem set #1*
  - ✓ **Monday, Jan. 27: Problem Set #1 is due [online through Quercus before 11:59pm]**

- **Week 5**. Monday, Feb. 3
  - Lecture 5. *Consumer Demand – Intro*
  - Tutorial 5. *Solution to this year's problem set #1*

- **Week 6**. Monday, Feb. 10
  - Lecture 6. *Consumer Demand – Econometric Issues & Methods*
  - Tutorial 6. *Demand Estimation in STATA (1/2)*

*** **READING WEEK – NO CLASSES – From Monday, Feb. 17 to Friday, Feb. 21**

- **Week 7**. Monday, Feb. 24
  - Lecture 7. *Consumer Demand – Empirical Applications*
  - Tutorial 7. *Demand Estimation in STATA (2/2)*

- **Week 8**. Monday, Mar. 3
  - Lecture 8. *Price & Quantity Competition - Intro*
  - ✓ **Monday, Mar. 3: MIDTERM EXAM (1.5 hours Exam – During Class/Tutorial)**

- **Week 9**. Monday, Mar. 10
  - Lecture 9. *Price & Quantity Competition – Econometric Issues & Methods*
  - Tutorial 9. *Estimation of Demand and Marginal Costs in STATA*

- **Week 10**. Monday, Mar. 17
  - Lecture 10. *Price & Quantity Competition – Empirical Applications*
  - Tutorial 10. *Merger Analysis in STATA*
  - ✓ **Monday, Mar. 17: Problem Set #2 is handed out**

- **Week 11**. Monday, Mar. 24
  - Lecture 11. *Market Entry – Intro*
  - Tutorial 11. *Solution to Previous Year's Problem Set #2*
  - ✓ **Monday, Mar. 24: Problem Set #2 is due [online through Quercus before 11:59pm]**

- **Week 12**. Monday, Mar. 31
  - Lecture 12. *Market Entry – Methods and Applications*
  - Tutorial 12. *Solution to this year's Problem Set #2*

  ✓ **FINAL EXAM: During Final Exam Period – To Be Announced**