

Game Theory for Applied Economists (AEM 702)

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Objective: This class will develop students' skills in game theory in an applied context. The course is designed for empiricists looking for the necessary tools to incorporate essential game theory concepts in their empirical work. Students will learn to set up and solve fundamental game theory models and then use them as a framework for empirical estimation. By enhancing their skills in building, solving, and applying game theory models, students will be better equipped to interpret their empirical estimates and assess the pros and cons of the econometric frameworks they utilize.

Methodology: To achieve the above objective, we will work through and solve several major classes of game theory models in an applied context. We will also analyze how these models are utilized in several empirical (primarily industrial organization) papers.

Meeting Times: Tuesdays and Thursdays, 11:40-12:55, from 1/22/07 – 2/21/07.

Textbooks: Gibbons, R. Game Theory for Applied Economists. Princeton University Press. 1992. Tirole, J. The Theory of Industrial Organization. MIT Press. 2000.

Other Readings: Empirical papers listed below.

Evaluation: Students will be evaluated based on homework (65%) and a final examination (35%). The final examination will be designed to prepare students for the Core Qualifying exam for AEM students at the end of the academic year.

Final: The final will be on *Friday, February 22*. It will be a two-hour exam to be completed at each student's discretion during the time period of 9:00 – 5:00 that day. For example, a student may pick up the exam at 10:30, and then will have until 12:30 to complete it and turn it in. Students are free to use their notes or other materials but may not discuss the final with others until all are turned in. Students who foresee a problem with taking the exam on the 22nd should bring this to the instructor's attention immediately.

Expected Preparation: Upon entering this course, it is expected that students are familiar with the definitions of: a game (static and dynamic, and in extensive and normal form), a strategy (pure and mixed), Nash equilibrium, strictly dominant and strictly dominated strategies, weakly dominant and weakly dominated strategies. We will discuss these terms and their definitions briefly in class; however, it is suggested that those unfamiliar with them carefully read Sections 11.1 and 11.2 in Tirole and/or pgs. 1-13 and 55-57 in Gibbons.

Course Outline:

- I. Weeks 1 & 2 – Static Games of Complete Information (Gibbons Ch. 1, Tirole Ch. 5, and static problems from Tirole Ch. 7)
 - a. Game theory overview
 - b. Solving static games
 - i. Iterated deletion of dominated strategies
 - ii. Identifying Nash equilibria
 - c. Cournot games
 - d. Bertrand games
 - e. Capacity constraints
 - f. Arbitration
 - g. The Problem of the Commons
 - h. Mixed Strategies
 - i. Spatial Competition
 - j. Game theory and NEIO
 - i. Bresnahan (1989)
 - ii. Burnstein (2005)
 - iii. Borenstein & Netz (1999)

- II. Weeks 3 & 4 – Dynamic Games of Complete Information (Gibbons Ch. 2, Tirole Ch. 6, and dynamic problems from Tirole Ch. 7 & 8)
 - a. Backward induction
 - b. Stackelberg games
 - c. Subgame perfection
 - d. Repeated games and collusion
 - e. Games of firm entry, accommodation, and exit
 - f. Dynamic games in empirical work
 - i. Porter (1983)
 - ii. Borenstein & Shepard (1996)
 - iii. Mazzeo (2002)

- III. Week 5 – Games with Incomplete Information (Bayesian Games) (Gibbons Ch. 3 & 4.1, Tirole Ch. 9)
 - a. Cournot competition under asymmetric information
 - b. Auctions
 - c. The revelation principle
 - d. Perfect Bayesian equilibrium and signaling games
 - e. Bayesian games in empirical work
 - i. Armantier & Richard (2003)

Empirical Papers to be (briefly) Discussed in Class:

T. Bresnahan, "Empirical Studies of Industries with Market Power," Handbook of Industrial Organization, Vol. 2, 1989, Chapter 17.

D. Burnstein, "An Examination of Market Power in the Intrastate Long-Distance Telephone Service Markets: Evidence from a Natural Experiment," Journal of Law and Economics, April 2005, 149-72.

S. Borenstein and A. Shepard, "Dynamic Pricing in Retail Gasoline Markets," Rand Journal of Economics, Autumn 1996, 429-51.

R. Porter, "A Study of Cartel Stability: The Joint Executive Committee, 1880-1886," Bell Journal of Economics, Autumn 1983, 301-14.

M. Mazzeo, "Product choice and oligopoly market structure," Rand Journal of Economics, Summer 2002, 221-42.

O. Armantier and O. Richard, "Exchanges of cost information in the airline industry," Rand Journal of Economics, Autumn 2003, 461-477.

S. Borenstein and J. Netz, "Why do all the flights leave at 8am?: Competition and departure-time differentiation in airline markets," International Journal of Industrial Organization, July 1999, 611-640.

**For those seeking further empirical IO readings, see the syllabus for my graduate IO course (on my website) for more references*