

Economics 460
Game Theory and Economic Behavior
Fall 2006
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Hours: T,R 10:00-11:30 & by apt.

This is a course in Game Theory. The prerequisites are economic statistics and microeconomic theory (Econ 265 and 275).

Game theory has become an important tool for economic analysis, and much of the development of this field has come from within the economics profession. Game theory studies the behavior of individuals in strategic situations, i.e., in situations in which the consequences of their actions depend on the actions of a small number of other individuals. Such mutual interdependence occurs widely in the economy. The competition between large firms over sales and product development are obvious examples. When a union decides to leave a bargaining table and call a strike, or a government establishes a trade policy or environmental regulation, or eBay determines the rules for its auctions, these players are either acting strategically or trying to influence the environment in which others are acting strategically. Our goal in this course is to cover a set of basic tools that have been developed within this field and to examine how well these tools help us understand a variety of economic phenomena.

The main text for the course will be Prajit K. Dutta, *Strategies and Games*. We will also read Brian Skyrms, *Evolution of the Social Contract*. These books are available at the College store and on reserve at the library. Additional readings will be placed on electronic reserve at the library, posted on my web page academics.hamilton.edu/economics/cgeorges/, or distributed in class. I have also placed a variety of other game theory texts on reserve in the library.

I hope to be able to run this class partly as a lecture class and partly as a seminar. Thus, I will assign material for students to present and discuss in class on a regular basis.

For students not doing a senior project in this class, grades will be assigned as follows:

- Final Exam: Saturday, Dec 16, 9:00 AM. 25% of grade.
- Midterm Exam: Monday, Oct 16, in class. 25% of grade.
- Paper: Final version due Friday, Dec 1, 12:00 noon, KJ 256. 25% of grade.
- Class presentations and participation. 25% of grade.

Students fulfilling their senior project in this class will have additional work that is described below.

I will also assign problems to work on at home (and sometimes discuss in class). These homeworks will not be graded.

I strongly encourage you to meet with me regularly to discuss the readings, lectures, and problems. If you can't make my scheduled office hours, I am very happy to meet with you by appointment.

All work for this course is covered by the terms of the honor code. You must take the midterm and final exam at the times listed above. If you believe that you have a legitimate scheduling conflict, you must see me in the first two weeks to see if it can be resolved. Otherwise, no exceptions will be granted. The paper is due (in hard copy) at the time listed above, with draft due dates as indicated below. I will not accept late papers.

Schedule of topics and primary readings:

1. Introduction:

Aug 28,30: Introduction, Representing Games, Review of Monopoly (Ch 1,2; Brandenburger and Nalebuff, "The Right Game")

2. Strategic Form Games:

Sept 4: Some Standard 2x2 Games, Dominance (Ch 3,4)

Sept 6: Nash Equilibrium (Ch 5)

Sept 11,13: Prisoners' Dilemma and Cournot Duopoly (Ch 6; web games; Frank, "Money Well Spent?")

Sept 18,20: Mixed Strategies, Natural Monopoly, Existence of Nash Equilibrium in Mixed Strategies (Ch 8, 9.1, 9.2, 28)

3. Extensive Form Games:

Sept 25,27: Perfect Information and Backward Induction, Relation to Strategic Form (Ch 11), Experimental Evidence (Dixit and Skeath, *Games of Strategy*, p. 70-73; Davis and Holt, *Experimental Economics*, pp. 106-109 and 263-269)

FALL BREAK

Oct 4,9: Subgame Perfection, Credibility of Commitments and Threats, Rationality and Self Control (Ch 13; Akerlof, "Procrastination and Obedience")

Wednesday, October 11: Paper proposals due (in class)

Oct 11: Finitely Repeated Games (Ch 14; Poundstone, *Prisoner's Dilemma*, Ch. 6)

MIDTERM EXAM Monday, October 16, in class.

Oct 18,23: Infinitely Repeated Games, Discounting, Rewards and Punishments, Trigger Strategies, Folk Theorem (Ch 15; *Games of Strategy* p. 271-274)

Oct 23,25: Applications: Competition and Collusion in NASDAQ and OPEC (Ch 16,17); Bargaining (Watson, *Strategy*, Ch. 19; *Experimental Economics*, p. 269-275); Reciprocity (Howitt, "Looking Inside the Labor Market")

4. Evolutionary Game Theory:

Oct 30, Nov 1: Evolutionary Games, Evolutionary Stable Strategies, Evolutionary Dynamics (Mailath, "Do People Play Nash Equilibrium? Lessons From Evolutionary Game Theory"; *Games of Strategy*, Ch 10 p. 320-354.

Nov 6: Evolution of Social Norms (Skyrms, *Evolution of the Social Contract*)

5. Incomplete Information and Bayesian Games:

Nov 8: Asymmetric Information and Principle Agent Problems (Ch. 19)

Friday, November 10: Paper draft 2 due by 12:00 noon, KJ 256.

Nov 13,15: Incomplete Information and Bayesian Games, Bayes-Nash Equilibrium (Ch 20,21; *Experimental Economics*, p. 381-406)

Nov 20: Auctions (Ch 22.1-22.3, 23; *Experimental Economics*, p. 288-295; Klemperer, "What Really Matters in Auction Design?")

THANKSGIVING BREAK

Nov 27,29: Perfect Bayesian Equilibrium, Screening and Signaling (Ch 24)

PAPERS DUE: Friday December 1, by 12:00 noon, KJ 256.

Dec 4,6: Presentation and Discussion of Papers

Dec 6: Conclusion

FINAL EXAM (cumulative): Saturday, Dec 16, 9:00 AM

You will need to select an issue or case that you would like to research. In your final paper you should state your research question, explain why the question is important, and discuss how game theory can be applied to it. What modeling and solution concepts are relevant to this problem? How is the question treated in the economics and game theory literature? Is the question controversial? If so, why? What methodological considerations stand in our way in understanding this problem? You should include a number of economics journal articles in your source material and describe several in some detail. You are welcome to try some simple modeling on your own and include this in your paper. If your issue or case is not directly treated in the literature, please discuss relevant literature on related issues.

The suggested length of the paper is 8-12 pages plus bibliography.

There are three required parts to this assignment. *I will not accept late assignments.*

Part 1: Detailed paper proposal. Due on or before Wednesday, October 11 (in class). 5% of course grade. The text should not be more than two pages in length. You should also include a short bibliography with some of the material that you plan to use in your final paper (please see the help sheet on citation and bibliography below) and make references to these sources in the text of your proposal. *Please be aware that the process of selecting a topic will involve a fair amount of research.* You will most likely begin with some ideas, look at possible sources, refine your topic, continue to collect references, etc. You should start by meeting with me to discuss possible topics.

Part 2: Work in progress. Due on or before Friday, November 10, at 12:00 noon (deliver hard copy to me in person or slide it under my door). 5% of course grade. Please present a two to three page abstract (summary) of your paper detailing what the paper sets out to do and summarizing what results you have found, a one to two page detailed discussion of at least two journal articles, and a preliminary bibliography.

Part 3: Final paper. Due on or before Friday, December 1 at 12:00 noon (deliver hard copy to me in person or slide it under my office door). 15% of course grade.

Please make an appointment to talk to me soon about your topic. I can help you narrow down a topic and get you started with some readings or suggest how to conduct a search.

You can search economics journals using EconLit (available from the college library web site). There are a number of specialized game theory journals within the field of economics. *Games and Economic Behavior* is probably the most accessible. Most general economics journals (such as the *Journal of Economic Perspectives*, *Journal of Economic Literature*, *American Economic Review*, *Quarterly Journal of Economics*, *Economic Inquiry*, *Journal of Economic Behavior and Organization*, etc.) and field journals (such as *Journal of Labor Economics*, *Journal of Industrial Economics*, etc.) also publish papers that use or contribute to game theory. SSRN (www.ssrn.com) is a repository for recent working papers which are not yet published.

Senior Project: Students taking Econ 460 as their Senior Project course should meet with me within the first two weeks of classes to start developing your topic and clarifying our expectations for the project. The paper assignment is as above, but with two additional elements. First, the final paper is expected to be 12-16 pages, rather than 8-12, and its scope will go beyond the scope of this course. Further, each Senior project student will make a formal presentation of their work on this paper to the class during the last week of classes. Grades are as above, except the midterm

will count for 20% of your grade and the senior project (paper and presentation) will count for 30%.

Here are a few sample paper topics:

- Auctions: e.g., how have recent spectrum auctions been designed, and how well have they worked?
- Bargaining: e.g., why do strikes occur? Case study of a labor dispute.
- Competition between firms over price, technology, etc.: e.g., Boeing and Airbus, Sony and Microsoft, Large Department Stores and Discount Chains, etc.
- International agreements: e.g., design of the Kyoto protocol, European currency union,...
- The stability of cartels: e.g., OPEC
- Evolution of technology standards: e.g., for high definition DVD, mobile phone transmission, automobile fuels (gas, electric, hydrogen), gaming systems, etc. R&D races. The protection of intellectual property rights.
- Is social cooperation based in altruism or selfishness? How are bargaining outcomes affected by culture?

News Presentations:

You will each give at least one brief news presentation at the beginning of a class, typically jointly with another student. The topic should be a recent news item related to the course or some other issue relevant to the course. You should collaborate with your partner on a single topic to present and divide the presentation between yourselves. The presentation should last no more than 5 minutes, so you each have at most two-three minutes to speak. After the presentation, you will have a few minutes to field questions from the rest of the class or to raise your own questions.

The presenters should (jointly) send an email to the rest of the class (using the email list in Blackboard) with a written summary (a few paragraphs) of their presentation and sources (including URLs if a source is on-line) no later than 7:00 PM the evening before the presentation.

In researching its topic, each team should seek out more than one source of information. For example, if you find an interesting topic in a news article from the New York Times, look for a statement from a relevant government agency or think tank that will answer questions that you had about the coverage in the Times.

There are a number of news sources that can be accessed on line. Hard copy of a variety of good economics news sources (Wall St. Journal, Financial Times of London, the Economist, etc.) are available at the library or Levitt Center. We also have access to full text archives of numerous news publications through Lexis-Nexis which you can get to from the Library database page. The Wall Street Journal is now available electronically via ALEX. Links to a number of government agencies, think tanks, etc., can be found on the Economics Department web resource page <http://www.hamilton.edu/academics/econ/Links.html>.

Practice Problem and Discussion Question Presentations:

You will each give several short presentations of practice problems and discussion questions during the semester, typically as part of a group presentation. When a group is assigned a problem or discussion question, each member of the group will turn in a concise writeup of his or her answer. The group should then divide the class presentation among itself. You may work together to generate your answers, but each student must generate his or her own writeup independently. The writeup should cover the entire problem or question, not just the part that the individual student presents in class.