

Economics 460
Game Theory and Economic Behavior
Spring 2017
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Hours: M,R 10:00-11:00, W 3:00-
4:00 & by apt.

This is a course in Game Theory. The prerequisites are economic statistics and microeconomic theory (Econ 265 and Econ 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 Joel Watson, *Strategy*, 3rd ed. We will also read Brian Skyrms, *Evolution of the Social Contract*, 2nd ed. Additional readings will be placed on electronic reserve, and problem sets and additional resources will be linked on my web page (see above). You will also need to purchase an online subscription to MobLab (\$18 for the semester) – you will receive an email from MobLab instructing you how to subscribe and join this course once the semester is underway.

I hope to be able to run this class partly as a lecture class and partly as a seminar. Thus, I will periodically assign material for students to present and discuss in class and will expect you to participate actively in class discussions.

Grades will be assigned as follows:

- Final Exam: Sunday, May 14, 2:00 PM. 25% of grade.
- Midterm Exam: Thursday, March 2, in class. 25% of grade.
- Paper: Final version due by Sunday, April 30 at midnight, on Blackboard. 25% of grade.
- Class presentations and participation. 25% of grade.

I will also assign problems to work on at home (and sometimes discuss in class). These homeworks will generally not be graded, with the exception that you will occasionally be asked to lead discussion on a particular problem (see attached handout on class presentations below).

I strongly encourage you to meet with me regularly to discuss the readings, lectures, and problems. You should also start meeting with me early in the semester to develop your paper topic. 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 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:

Jan 17,19 Introduction, Representing Games: the Extensive and Normal Forms, Review of Monopoly (Ch 2,3)

Jan 24: Mixed Strategies (Ch 4), Rational Play (Ch 5), Brandenburger and Nalebuff, “The Right Game” (ignore “value net”)

2. The Normal Form:

Jan 26: Dominance and Rationalizable Strategies (Ch 6,7);

Jan 31: Nash Equilibrium (Ch 9) (ignore section on congruous sets)

Feb 2: Prisoners’ Dilemma and Cournot Duopoly (Ch 10; Frank, “Money Well Spent?”), Games With Many Players or Large Strategy Spaces.

Feb 7: Mixed Strategy Nash Equilibrium (Ch 11)

Feb 9: Nash’s Theorem (Nash “Equilibrium Points in n-Person Games”; Watson Appendix C), Empirical Evidence (Walker and Wooders “Minimax Play at Wimbledon”)

3. The Extensive Form:

Feb 14,16: Backward Induction and Subgame Perfect Nash Equilibrium, Credibility of Commitments and Threats (Ch 14,15)

Feb 21: Experimental Evidence on Sequential Rationality (no reading), Social Preferences (Henrich et al. “In Search of Homo Economicus”) Bounded Rationality (Akerlof, “Procrastination and Obedience”)

Feb 23: Bargaining (Ch 19)

Sunday Feb 26: Paper proposals due by midnight, on Blackboard.

Feb 28: Finitely Repeated Games (Ch 22 p. 291–296)

MIDTERM EXAM: Thursday March 2, in class.

Mar 7: Infinitely Repeated Games, Rewards and Punishments, Reputation, Trigger Strategies and the Folk Theorem (Ch 22)

Mar 9: Applications: Collusion and Enforcement of Agreements (Ch 23, Christie and Schultz “Why do NADAQ Market Makers Avoid Odd Eighth Quotes”), Social Preferences and Reciprocity (Howitt, “Looking Inside the Labor Market”)

SPRING BREAK

Mar 28: Empirical Evidence On Play in Repeated Games , web games (no reading)

4. Evolutionary Game Theory:

Mar 30, Apr 4: Evolutionary Games, Evolutionary Stable Strategies, Evolutionary Dynamics (Mailath, “Do People Play Nash Equilibrium? Lessons From Evolutionary Game Theory”; *Games of Strategy*, Ch 10)

Sunday, April 2: Paper draft 2 due by midnight, on Blackboard.

Apr 4: AI, Deep Blue and AlphaGo (Nature, “The Computer that Mastered Go” (video))

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

5. Incomplete Information and Bayesian Games:

Apr 11: Asymmetric Information and Principal Agent Problems (Ch. 24,25)

Apr 13,18: Incomplete Information and Bayesian Games, Bayes-Nash Equilibrium (Ch 26)

Apr 20: Auctions (Ch 27; Klemperer, “What Really Matters in Auction Design?”)

Apr 25,27: Perfect Bayesian Equilibrium, Screening and Signaling (Ch 28,29)

PAPERS DUE: Sunday April 30 by midnight, on Blackboard.

May 2: Discussion of Papers

May 4: Conclusion

FINAL EXAM (cumulative): Sunday, May 14, 2:00 PM

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. How is the question treated in the economics and game theory literature? What modeling and solution concepts are relevant to this problem? 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 (and/or working papers) 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 but need not do so – generating a useful model can be quite difficult. 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 Sunday, February 26 by midnight (upload to Blackboard). 5% of course grade. The text should not be more than two pages in length. You should additionally include a short bibliography with some of the material (e.g., 4-5 journal articles) that you plan to use in your final paper and make references to these sources in the text of your proposal (please see the help sheet on citation and bibliography below). *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 Sunday April 2, at midnight (upload to Blackboard). 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 Sunday April 30, at midnight (upload to Blackboard). 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) and recent working papers using SSRN (www.ssrn.com) as well as Google Scholar. You can search using keywords relevant to your topic and then can add (e.g.) “game” or “strategic” as search keywords as well. Game theory is used in a very wide variety of economics literature. You will find these papers published in 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.) field journals (such as *Journal of Labor Economics*, *Journal of Industrial Economics*, etc.) and specialized game theory game theory journals within the field of economics (e.g., *Games and Economic Behavior*). Some journals are more accessible than others – for example you will find the *Journal of Economic Perspectives* substantially more accessible than the *Journal of Economic Theory*.

Here are a few sample paper topics:

- Auctions: e.g., how have spectrum auctions been designed, and how well have they worked? Similarly, Treasury auctions, online auctions (eBay), online advertising auctions (Facebook, Google), etc.
- Bargaining: e.g., why do strikes occur? Case study of a labor dispute. How are bargaining outcomes affected by culture, emotion, social preferences?
- Competition between firms over price, technology, etc.: e.g., Boeing and Airbus, Sony and Microsoft, Amazon and bricks and mortar retail, Toyota and Ford, Google and Facebook, Uber and Google, Airbnb and hotel chains, etc.
- International agreements: e.g., environmental agreements, trade agreements, currency unions, economic unions (Brexit).
- The stability of cartels: e.g., OPEC
- Evolution of technology standards: e.g., for high definition video, mobile phone transmission, automobile fuels (gas, electric, hydrogen), gaming systems, etc. R&D races. The protection of intellectual property rights.
- Roots of the 2008 financial crisis in moral hazard and failures of risk management. Bailouts and mechanism design.
- Is social cooperation based in altruism or selfishness or both? What are the game theoretic foundations of trust?
- Write a survey paper on methods in evolutionary game theory.
- Write a survey paper on agent-based models in game theory. (for comp sci enthusiasts).
- Develop an evolutionary game simulation. (for comp sci enthusiasts).
- What can we learn about strategic behavior from neuroeconomics?

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 available 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 type 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 or scholarly article that will answer questions that you had about the coverage in the Times.

Practice Problem and Discussion Question Presentations:

You will each give at least one short presentation of a practice problem, discussion question, or reading 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 and turn in 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.