Syllabus for ECON 201B Game Theory

Winter 2017, Department of Economics UCLA

Time and Location

Lecture: Monday and Wednesday, 9:30am – 10:45am, Bunche 3211
Section: Friday, 10:00am – 11:50am, Bunche 3178

Instructor

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Overview

Game Theory provides a set of tools to study the interaction of multiple strategic agents, that is, situations in which the payoff of one agent, say firm A's profit, depends not only on its own actions, say the quantity it produces, but also on the actions of other agents, say the quantity of A's competitor. This course introduces the basic concepts of game theory and illustrates them with numerous applications.

The best way to learn game theory is by applying it to examples and we will do so extensively in class, homework assignments, and practice problems over the course of the quarter. The prerequisites for this class are undergraduate game theory, and Econ 200 (mathematical methods in economics) or equivalent.

Grading

There will be bi-weekly homework assignments, an in-class midterm on Monday, February 13th, and a final exam on Thursday, March 23rd, 11:30am – 2:30pm. The final grade is based 50/30/20 on exam/midterm/homeworks. I encourage you to work together on the homeworks, but require everybody to write down and hand in her solutions to the homework separately. Problem sets are due on Monday morning before class.

Textbooks

The course is self-contained and I will publish my lecture notes on the class website, usually the night before the lecture. There is thus no required textbook. However, the class draws from material in the following, highly recommended textbooks. Fudenberg and Tirole (*Game Theory*, MIT) is maybe the most comprehensive, covering much more material than the course, both in terms of pure theory and applications. Gibbons (*Game Theory for Applied Economists*, Princeton) is a more elementary treatment. It covers most, if maybe not all the material covered in class. It's a

great choice for applied economists who are looking for an accessible introduction to game theory, while FT may be more useful as a reference for those who anticipate actively using game theory in their future work. Osborne and Rubinstein (*A Course in Game Theory*, MIT) and Myerson (*Game Theory*, Harvard) are a game theorist's game theory books, that offer a more abstract treatment with less emphasis on applications, and present the material in a somewhat different order than the class. They are great choices for mathematically minded students who plan to write a thesis in pure economic theory.

Standard, graduate-level microeconomic textbooks, such as Mas-Colell, Whinston, Green (*Microeconomic Theory*, Oxford), Kreps (*A Course in Microeconomic Theory,* Princeton), and Riley (*Essential Microeconomics,* Cambridge), also offer good introductions to game theory, but do not cover all of the topics covered in class.

Dixit, Skeath, Reiley (*Games of Strategy*, Norton) and Schelling (*The Strategy of Conflict*, Norton) are lighter, less technical introductions to game theory. These books are not targeted at economics graduate students but they contain a great wealth of game theoretic ideas which you may find useful as background reading.

Lecture Plan (approximate)

Static Games

- Dominant strategies
- Iterated dominance and rationalizability
- Weak dominance
- Nash equilibrium in pure strategies
- Applications of Nash equilibrium
  - Bertrand competition
  - Cournot competition
  - Hotelling competition
- Mixed strategy Nash equilibrium
- Alternative equilibrium concepts
- Bayesian Nash equilibrium
- Applications of Bayesian Nash equilibrium
  - Auctions
  - Public goods

Dynamic Games

- Subgame perfect equilibrium
- Applications of subgame perfect equilibrium
  - Stackelberg competition
  - Entry deterrence
  - Bargaining
- Repeated games
- Perfect Bayesian equilibrium
- Sequential equilibrium
- Additional refinements
- Applications of sequential equilibrium
  - Reputation
  - Signaling
  - Cheap talk