

## ECONOMICS 603 Part II: Game Theory

Spring 2008

Instructor: Jinhua Zhao

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377 Heady, 294-5857

Lectures: TTh: 9:30–11:20am, 272 Heady

Office hours: M,F: 2-3pm, or by appt

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280D Heady, 294-2177

Discussions: F 3:10-4pm, 272 Heady

The second part of the course covers introductory non-cooperative game theory and its applications. The theory part is rather standard: we will cover strategic games, Bayesian games, extensive games, and the solution concepts of Nash equilibrium, Bayesian equilibrium, Subgame perfect NE, (weak) perfect Bayesian equilibrium, sequential equilibrium, and possibly perfect Bayesian equilibrium. We may briefly discuss other refinements of NE including trembling hand perfect equilibrium and forward induction. For applications, I will focus mostly on problems of asymmetric information, including auctions, bilateral bargaining, signaling, screening, moral hazard, adverse selection, and possibly mechanism design. Many of these topics were developed parallel to game theory, but in this course, I will simply group them as applications of game theory. Our discussion of these topics will be introductory, emphasizing the game theory concepts involved.

This course focuses on the *theory* part of introductory game theory. We do not cover the rich and growing experimental evidences showing the widespread irrational behaviors in games. Nor will we cover the more advanced topics such as evolutionary games and behavioral game theory.

### Prerequisite:

Econ 601, and mathematical sophistication. The course does not require much math skills: we may take a couple of first order conditions, do some integration by parts, and take some conditional expectations. In the extreme, we may solve a very simple differential equation. However, the course does require a lot of logical analysis that is the essence of mathematics, and the willingness to reason carefully, formally, and in abstract.

### Texts:

Mas-Colell, Whinston and Green, *Microeconomic Theory*, 1995 (required, on reserve)

Nice coverage of basic game theory and information economics. Very useful exercises.

Gibbens, Robert, *Game Theory for Applied Economists*, Princeton University Press, 1992 (recommended, on reserve)

More student-friendly, with more intuition and more applications. A very good supplement to MWG.

Osborne, Martin and Ariel Rubinstein, *A Course in Game Theory*, MIT Press, 1994 (recommended, on reserve)

One of the advanced textbooks on game theory. Solid and succinct.

Fudenberg, Drew and Jean Tirole, *Game Theory*, MIT Press, 1993

Comprehensive, advanced.

Binmore, *Fun and Games, a Text on Game Theory*, D.C. Heath, 1991

fun to read, covers materials beyond economics.

Laffont, Jean-Jacques and David Martimort, *The Theory of Incentives: The Principal-Agent Model*, Princeton University Press, 2002

Nice coverage of moral hazard and adverse selection, some mechanism design

### **Grades:**

20% homework and 80% final exam for this part, which constitutes half of your grade for this course. Professor Lapan and I will jointly determine the final grade.

### **Homework:**

Homework is essential for understanding the theory. You can collaborate, but the final form of your homework has to be finished by yourself only. For those of you with access to “answer books” in case I assign problems from textbooks, it is *important* that you do NOT consult the answer books until after you hand in your homework and after the TA has discussed the answers in class.

### **Course Outline:**

I. Strategic Games (MWG Ch8; supplemental: Gibbens Ch 1, 3; OR Ch 2, 3.1-2, 4)

1. Definition
2. Elimination of dominated strategies
3. Nash equilibrium
4. Mixed strategies
5. Bayesian games (static games of incomplete information)

II. Extensive games (MWG Ch7, 9, 12.D; supplemental: Gibbens Ch 2 4; OR Ch 6, 11, 12)

1. Extensive form representation
2. Subgame perfect NE
3. Weak perfect Bayesian equilibrium
4. Sequential equilibrium, Perfect Bayesian equilibrium [tentative]

III. Adverse selection in markets (MWG Ch13; supplemental: Crawford and Sobel)

1. Akerlof's lemon problem
2. Costly signaling
3. Screening [tentative]
4. Costless signaling (cheap talk) [tentative]

IV. The Principal-Agent model (MWG Ch14; supplemental: LM Ch 2 - 4) [tentative]

1. Adverse selection
2. Moral hazard