

## Econ. 181B. Game Theory and Economic Applications

Lecture time and location: **Tue, Fri, 12:00 – 1:30pm, Lemberg 55**  
Office Hour: Tue. 1:30 – 3:30pm (Sachar Room 4, in the PhD room) or by appointment  
Prerequisites: Econ 80a and Econ 83a  
Teaching Assistant: Ly Tran, [lyhuyen@brandeis.edu](mailto:lyhuyen@brandeis.edu)  
TA's office hour: Mon. 5 – 6pm (PhD room)

### **Description**

Games, in the context of game theory, refer to scenarios in which each decision maker, through his action, impacts not only his own but also the welfare of other decision makers in the scenario. As a result, each decision maker in games must take into account the decisions and actions of others. This course will introduce five categories of games based on common informational structures, present relevant game-theoretic tools, and demonstrate real-world applications of these analytical tools. The categories of games are: static games with complete information, dynamic games with complete information, games with uncertain outcomes, static games with incomplete information, and dynamic games with incomplete information. Applications include oligopoly, voting, bargaining, and auctions. In addition, we will review some case studies of games in experiments and play some *games* ourselves.

### **Textbooks**

H. Scott Bierman and Luis Fernandez, *Game Theory with Economic Applications*, 2<sup>nd</sup> edition, Addison-Wesley, 1998. We will cover all five types of games introduced in this book and selected applications based on time and interests.

(Optional) Charles A. Holt, *Markets, Games, and Strategic Behavior*, Pearson Education, 2007. Some of the computer-based experiments in this class are taken from this book.

### **Course work and grading**

Course material will be covered through assigned readings, lectures, problems sets, and class discussion. Problem sets are assigned on a weekly basis, due every Tuesday at the beginning of the class. Out of a total of twelve problem sets, the one with the lowest grade will be dropped for overall grade calculation. The midterm exam is given on February 29<sup>th</sup>; no make-up exam is given without special permission from the Dean's office. A cumulative three-hour final exam is scheduled for May 8, 1:30 to 4:30pm. The

project will result in a short in-class presentation of either an experiment or an application of a game theoretic model.

### **Grading**

|                                    |     |
|------------------------------------|-----|
| Class participation & pop quizzes: | 10% |
| Project:                           | 10% |
| Problem Sets:                      | 25% |
| Midterm:                           | 25% |
| Final:                             | 30% |

### **Academic Honesty**

You are expected to be honest in all of your academic work. The University policy on academic honesty is distributed annually as section 5 of the rights and Responsibilities handbook. Instances of suspected dishonesty will be forwarded to the Office of Campus Life for possible referral to the Student Judicial System. Potential sanctions include failure in the course and suspension from the University. If you have any questions about my expectations, please ask.

### **Disability Statement**

If you are a student with a documented disability on record at Brandeis University and you wish to have a reasonable accommodation made for you in this class, please see me immediately. Please keep in mind that reasonable accommodations are not provided retroactively.

### **Course Outline**

We will be guided by Bierman and Fernandez, with an emphasis on applying a relatively small set of game-theoretic tools to understand important economic and social phenomena. We expect to cover the following chapters from Bierman and Fernandez, on average one chapter per week, although changes may be made as we move along, based on student interests. We will supplement these theories and applications with experiments from Holt to get a sense of how human behavior compares with theoretical predictions.

Chapter 1. Nash Equilibrium (wk 1)

Chapter 2. Oligopoly (wk 2)

Chapter 5. Voting (wk 3)

Chapter 6. Subgame Perfect Equilibrium (wk 4)

Chapter 7. Bargaining (wk 5)

-----Midterm review and midterm exam----- (wk 6)

Chapter 8. Time-Consistent Macroeconomic Policy (wk 7)

Chapter 9. Repeated Games and Dynamic Competition (wk 8)

Chapter 10. Uncertainty and Expected Utility (wk 9)

Chapter 11. Moral Hazard and Incomplete Insurance (wk 10)

Chapter 13. Bayesian Nash Equilibrium (wk 11)

Chapter 14. Auctions (wk 12)

Chapter 15. Perfect Bayesian Equilibrium (wk 13)

Chapter 16. Bargaining with Private Information (wk 14)

-----Final exam review and final exam