

Mathematical Models: Game Theory II

Instructor: Catherine Hafer, New York University

e-mail: catherine.hafer@nyu.edu

Teaching Assistant: Anna Bassi

e-mail: anna.bassi@nyu.edu

Course Description

This course is designed for students who have already Game Theory I, but who desire greater proficiency in the more advanced topics. The course focuses on canonical games of incomplete information that are used widely in all fields of political science and political economy, e.g. signaling games, cheap-talk games, and wars of attrition. It will also introduce students to theoretical topics that are beginning to play a prominent role in recent contributions to the political science literature, e.g. Markov games and monotone comparative statics. The course is suitable for students who, in the course of their own research, wish to evaluate, critique, or otherwise engage formal-theoretic work, as well as those who anticipate using game theoretic techniques themselves. Questions concerning the interpretation of models and the evaluation of models will be discussed extensively.

Course Requirements

In order to maximize the benefits from taking this course, it is essential that students treat the assignments as learning tools, alongside lectures and reading assignments. Toward this end, we strongly encourage the students to work through the assigned problems on their own *before* comparing notes with classmates.

Students will be assigned 1-2 problems at the end of each lecture, to be submitted for grading each week. There will also be a comprehensive exam at the end of the course.

Required Game Theory Texts:

Gibbons, Robert. 1992. *Game Theory for Applied Economists*. Princeton: Princeton University Press.

Other required readings:

Acemoglu, Daron and James A. Robinson. 2001. "A Theory of Political Transitions." *American Economic Review* 91, pp 938-963.

Ashworth, Scott, and Ethan Bueno de Mesquita. 2005. "Applications of Monotone Comparative Statics in Political Science." *American Journal of Political Science* 50, pp. 214-31.

Austen-Smith, David and Jeffrey S. Banks. 1996. "Information Aggregation, Rationality and the Condorcet Jury Theorem." *American Political Science Review* 90, pp. 34-45.

Banks, Jeffrey S. 1990. "Equilibrium Behavior in Crisis Bargaining Games." *American Journal of Political Science*, vol. 34, no. 3, pp. 599-614.

Banks, Jeffrey S. 1989. *Signaling Games in Political Science*. Harwood Academic Publishers, Chs. TBA.

Banks, Jeffrey S. and Randall Calvert. 1992. "Coordination and Cheap Talk." *Games and Economic Behavior*.

Gordon, Sanford and Catherine Hafer. 2005. "Flexing Muscle: Corporate Political Expenditures as Signals to the Bureaucracy." *American Political Science Review*, vol. 59, no. 2.

Gordon, Sanford, Gregory Huber and Dimitri Landa. 2005. "Challenger Entry and Voter Learning." NYU Mimeo.

Hafer, Catherine. 2006/2004. "Contests over Political Authority." NYU Mimeo.

Rubinstein, Ariel. 1991. "Comments on the Interpretation of Game Theory." *Econometrica* 59, pp. 909-924.

Vives, Xavier. 1999. *Oligopoly Pricing: Old Ideas and New Tools*. Cambridge: MIT Press, Ch. 2.

Recommended Game Theory Texts

You may wish to consult other game theory texts, in particular those listed below. Which of these additional texts is best suited to your needs should be a function of your background knowledge and how much you hope to do with game theory.

Fudenberg, David and Jean Tirole. 1991. *Game Theory*. Cambridge: MIT Press. Although it is somewhat dated, this book is still the most comprehensive survey of game theory available. It is a great reference book for anyone who intends to write game-theoretic models, but it makes substantial demands on the analytical skills of the readers and often expects that the basic material is already known.

Osborne, Martin and Ariel Rubinstein. 1994. *A Course in Game Theory*. Cambridge: MIT Press.

This text is somewhat more analytically demanding than Gibbons'. It provides a much more detailed discussion of some of the more advanced topics, e.g. equilibrium refinements in extensive-form games of incomplete information, which makes it an excellent companion to such a text, although it is a comprehensive introduction in its own right.

Myerson, Roger. 1991. *Game Theory: Analysis of Conflict*. Cambridge: Harvard University Press.

This book presents the most systematic and nuanced, but mathematically unsparing, treatment of the subject. It is the best textbook for people who are very comfortable with mathematical tools.

Rasmussen, Erik. 1994. *Games and Information: An Introduction to Game Theory*. Oxford: Basil Blackwell.

This book is less analytically demanding than Myerson's or Fudenberg and Tirole's. Its balance of formal rigor and conceptual intuition is comparable to Gibbons'.

McCarty, Nolan and Adam Meirowitz. 2005. *Game Theory for Political Science*. Princeton University Mimeo.

This introductory book contains many extensively worked examples from political science. It also includes a systematic introduction to utility theory and a mathematical appendix.

Topics:

1. Review of Static Games of Incomplete Information and Bayesian Equilibrium

Read: Gibbons, Ch. 3

2. Introduction to Mechanism Design and the Revelation Principle

Read: Gibbons, pp. 164-168

Application: Banks (1990)

3. Introduction to Sequential Games of Incomplete Information and Perfect Bayesian Equilibrium

Read: Gibbons, pp. 173-83; Osborne and Rubinstein, Ch.12

4. Costly Signaling Games

Read: Gibbons, pp. 183-210, 233-244; Banks (1989), Ch. 1-2

Applications: Gordon and Hafer (2005); Gordon, Huber, and Landa (2005); Austen-Smith and Banks (1996)

5. Signaling Games and Cheap Talk

Read: Gibbons, pp. 210-218; Banks (1989), Ch. 1-2

Application: Banks and Calvert (1992)

6. Sequential Equilibrium and further refinements

7. Introduction to Monotone Comparative Statics

Read: Ashworth and Bueno de Mesquita (2005); Vives (1999) Ch. 2

8. Introduction to Timing Games: The War of Attrition

Application: Hafer (2006/2004)

9. Introduction to Markov Games and Markov-Perfect Equilibrium

Application: Acemoglu and Robinson (2001)

10. What Makes a Game-Theoretic Model Good?

Read: Rubinstein (1991)