

GAME THEORY I

POL 8124
Fall 2012
M 3:35-5.20
Social Sciences 1383
Office Hours: W. 3.30-5.30

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Course Description

This course is intended to introduce Ph.D. students to the concepts and tools underlying game theoretic modeling: preferences relations, game structure, and equilibrium solution concepts. It is intended to impart a basic fluency with these tools, not to extensively cover the craft of writing models (which will be covered more thoroughly in Game Theory II) or to review a particular set of substantive applications. With that purpose in mind, much of the class – particularly the earlier sessions – will draw on textbooks for reading and will cover definitions and stylized examples. We will review substantive applications as illustrations of game theoretic concepts – drawn from the political science literature – in the latter portions of the course. The following topics will be covered in the class: Preference representations (Utility and Expected Utility Theory), preference aggregation/social choice, Nash equilibrium (in pure and mixed strategies), extensive form games and subgame perfection, repeated play, Bayesian and Perfect Bayesian Nash equilibria, and refinements to Perfect Bayesian Nash.

Assignments

Problem sets will be regularly assigned – approximately every week. The purpose of these problems sets is primarily to familiarize students with concepts introduced in class. I will certainly permit students to collaborate on problem sets; though, I would suggest attempting to reach solutions on your own before meeting in groups. Of the n problem sets assigned during the course of the term, the $n - 1$ on which you receive the highest scores will be factored into your final grade.

I will also administer an in-class midterm and a final exam.

Grading

Midterm Exam (30%)

Final Exam (40%)

Problem Sets (25%)

Participation (5%)

Recommended Texts:

Nolan McCarty and Adam Meirowitz. *Political Game Theory: An Introduction*. Cambridge University Press, 2007

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

Ariel Rubinstein. *Lecture Notes in Microeconomic Theory*. Princeton University Press, 2nd edition, 2012 (available online at arielrubinstein.tau.ac.il/Rubinstein2007.pdf)

All other readings will be provided

Class Outline

September 10: Introduction, The Purpose of Models

Review Structure of Course
Purpose and Value of Models
Things to Avoid when Writing Models

Readings:

- Paul Krugman. The fall and rise of development economics. 1994
- Chapters 3 & 4, pages 52-93 in Kevin A. Clarke and David M. Primo. *A Model Discipline: Political Science and the Logic of Representations*. Oxford University Press, 2012
- Ariel Rubinstein. Dilemmas of an economic theorist. *Econometrica*, 74(4):865–883, 2006

September 17: Rational Choice Theory and Utility Representations

Binary Relations
Def'n of preferences
Utility Theory
Expected Utility Theory

Readings:

- Chapters 1,2, & 8 in Ariel Rubinstein. *Lecture Notes in Microeconomic Theory*. Princeton University Press, 2nd edition, 2012
- Pages 6-21 and 27-57 in Nolan McCarty and Adam Meirowitz. *Political Game Theory: An Introduction*. Cambridge University Press, 2007

September 24: Preference Aggregation and the Median Voter Theorem

Preference Aggregation Rules
Social Choice
Preference Restrictions
Median Voter Theorem

Readings:

- Chapters 2 & 4 in David Austen-Smith and Jeffrey S. Banks. *Positive Political Theory I: Collective Preference*. University of Michigan Press, 2000
- Chapter 4 in Nolan McCarty and Adam Meirowitz. *Political Game Theory: An Introduction*. Cambridge University Press, 2007

October 1: Nash Equilibrium in Pure Strategies

Intro. to Normal Form Games
Dominance & Iterated Dominance
Def'n of Nash Equilibrium in Pure Strategies

Readings:

- Chapter 5, Parts 1-3 in Nolan McCarty and Adam Meirowitz. *Political Game Theory: An Introduction*. Cambridge University Press, 2007

October 8: Nash Equilibrium in Mixed Strategies

Zero-sum games
Def'n of Nash Eq'm in Mixed Strategies
Colonel Blotto and Other PoliSci examples

Readings:

- Chapter 5, parts 4-9 5 in Nolan McCarty and Adam Meirowitz. *Political Game Theory: An Introduction*. Cambridge University Press, 2007

October 15: Existence of Nash and Review of Normal Form Games

Brouwer's and Kakutani's Fixed Point Theorems
Proof of Existence of Nash
Review of Previous Classes

Readings:

- Chapter 5, part 10 in Nolan McCarty and Adam Meirowitz. *Political Game Theory: An Introduction*. Cambridge University Press, 2007
- Pages 33-48 in Robert Gibbons. *Game Theory for Applied Economists*. Princeton University Press, 1992

October 22: Extensive form Games and Subgame Perfection

Intro. to Extensive Form
'Non-credible' Nash Equilibria

Subgame Perfection Refinement and Backwards Induction
Examples from IR literature

Readings:

- Chapter 2, parts 1 & 2 in Robert Gibbons. *Game Theory for Applied Economists*. Princeton University Press, 1992
- Alastair Smith. Alliance formation and war. *International Studies Quarterly*, 39.4:405–425, December 1995

October 29: Extensive form Games and Subgame Perfection II

Examples with Continuous Strategy Spaces
Central Bank Time-Inconsistency

Readings:

- Philip Keefer and David Stasavage. The limits of delegation: Veto players, central bank independence, and the credibility of monetary policy. *American Political Science Review*, 97(3):407–423, August 2003

November 5: Midterm Exam

November 12: Repeated Games

Finitely Repeated Games (Centipede Game)
Infinite Horizon Models
Continuation Values and Trigger Strategies
Folk Theorem Results

Readings:

- Chapters 14 & 15 in Martin J. Osborne. *An Introduction to Game Theory*. Oxford University Press, New York, 2004
- Robert Axelrod. The emergence of cooperation among egoists. *American Political Science Review*, 75(2):306–318, June 1981

November 19: Normal Form Games of Incomplete Information

Types and States of the World
Def'n of Bayesian Nash
Examples

Readings:

- Chapter 6 in Nolan McCarty and Adam Meirowitz. *Political Game Theory: An Introduction*. Cambridge University Press, 2007

November 26: Extensive Form Games of Incomplete Information

Importance of Who Moves First
Perfect Bayesian Equilibrium Concept
Introduction to Costly-Signaling (Beer-Quiche Game)

Readings:

- Chapter 8, Parts 1-5 in Nolan McCarty and Adam Meirowitz. *Political Game Theory: An Introduction*. Cambridge University Press, 2007

December 3: Signaling Games

Costly signaling cnt'd – PoliSci Example
'Cheap-Talk' Crawford-Sobel Games

Readings:

- James R. Hollyer and B. Peter Rosendorff. Why do authoritarian regimes sign the convention against torture? signaling, domestic politics, and non-compliance. *Quarterly Journal of Political Science*, 6(3-4):275–327, December 2011
- Chapter 4, Part 3 in Robert Gibbons. *Game Theory for Applied Economists*. Princeton University Press, 1992
- Chapter 4, Parts 1 & 2 in Gene M. Grossman and Elhanan Helpman. *Special Interest Politics*. The MIT Press, 2001

December 10: Refinements to Perfect Bayesian Equilibrium

Importance of Off-Path Beliefs in Pooling/Babbling Equilibria
Non-sensical Perfect Bayesian Equilibria
Intuitive Criterion Refinement

Readings:

- Chapter 8, Part 6 in Nolan McCarty and Adam Meirowitz. *Political Game Theory: An Introduction*. Cambridge University Press, 2007
- In-Koo Cho and David M. Kreps. Signaling games and stable equilibria. *The Quarterly Journal of Economics*, 102(2):179–222, May 1987

Final Exam: Date TBD