Public Policy 419
Formal Models in the Politics of Policymaking
(Introduction to Game Theory)
Winter 2009

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Course website The course has a website at chalk.uchicago.edu

Course Description This course will primarily focus on introducing the foundational concepts in noncooperative game theory. We will also touch on basic social choice theory and the spatial model. Importantly, despite the course name, this is not an applied models course. It is an introduction to game theory. We will get to applications when and if we can, but this is not our main goal. In order to read the applied literature with sophistication (let alone contributing to it) it is important to first have a foundation in the theory.

I assume that students have a working knowledge of some foundational mathematics including sets and relations, basic calculus, and basic probability theory.

Course Requirements The course has three requirements:

- **Problem Sets** Problem sets will be distributed and due each Thursday. Because working problems is critical to learning game theory, these problem sets will constitute 40% of your grade. You are encouraged to work on problem sets in groups, but you must write up your own answers. Late problem sets will not be accepted. All problem sets must be written clearly or typed. Moreover, the expectation is that the argument underlying

your answers will be laid out in an easy to follow string of logic. That is, the TA and professor should not have to work hard to figure out what it is you are arguing. This will almost certainly mean that you will have to rewrite your solution (once you have arrived at it) before turning in the problem set.

- **Midterm** There will be an in class midterm exam on February 5. It will count for 25% of your grade.
- **Final** There will be a comprehensive in-class final at the end of the quarter that will make up the remaining 35% of your grade.

Course Materials The required textbook for this course is Martin J. Osborne. 2004. *An Introduction to Game Theory.* Oxford: Oxford University Press.

Additional Materials I addition to the required book, you may be interested in some additional reading on math for social scientists and/or game theory. Here are few recommendations.

Math Books

- Daniel Kleppner and Norman Ramsey. *Quick Calculus: A Self-Teaching Guide.* Spend a weekend with this book if you need a quick calculus refresher.
- Carl P. Simon and Lawrence Blume. *Mathematics for Economists.* A good introduction to most of the basic mathematics you will need to do applied theory.
- Morris DeGroot. *Optimal Statistical Decisions.* This classic introduction to the use of probability to think about decision making is finally back in print after many years. A wonderful book.

Game Theory Books

- Nolan McCarty and Adam Meirowitz. *Political Game Theory.* This bookis a pretty rigorous game theory text, focusing almost exclusively on political science applications and problems.
- James D. Morrow. *Game Theory for Political Scientists.* A fairly easy (around the same level as Osborne) introduction to game theory, focusing on political applications.
- Robert Gibbons. *Game Theory for Applied Economists.* A slightly harder (not much, but with some calculus) but less complete introduction to game theory. The applications are to classic economic problems.
- Ken Binmore. *Fun and Games.* A quixotic, classic introduction to game theory the way only Binmore could do it. With applications to Alice in Wonderland, Kant, ...
- Drew Fudenberg and Jean Tirole. *Game Theory.* A fairly encyclopedic, somewhat hard to read, pretty technical treatment.
- Martin J. Osborne and Ariel Rubinstein. *A Course in Game Theory.* One of the two most rigorous, complete game theory texts available. Outstanding, but hard.
- Roger B. Myerson. *Game Theory: Analysis of Conflict.* The other of the two most rigorous game theory texts available. My favorite, but quite hard.

Course Schedule

Below, I provide an outline of the course. I provide a list of topics and the relevant readings. We will see how long each section takes as we go.

Foundations of Decision Theory

Models of Complete Information

Strategic-Form Games and Pure Strategy Nash Equilibrium

Osborne, Chapter 2 and pp. 70–79

Expected utility

Mixed Strategy Equilibria of Strategic-Form Games, Equilibrium Existence, and Continuous Action Spaces

Osborne, Chapter 4

Extensive-Form Games and Subgame Perfection

Osborne, Chapter 5, 6.1, 6.3

Infinitely Repeated Games, the One-Shot Deviation Principle, and Folk Theorems

Osborne, Chapter 14, 15

Games of Imperfect Information

Bayesian Games

Osborne, Chapter 9

Extensive-form Games with Incomplete Information and Perfect Bayesian Equilibrium

Osborne, Chapter 10

Costly Signaling and Cheap Talk

Further Topics

Comparative Statics

Scott Ashworth and Ethan Bueno de Mesquita. 2006. "Monotone Comparative Statics in Models of Politics: A Method for Simplifying Analysis and Enhancing Empirical Content." *American Journal of Political Science* 50(1):214–231.

Social Choice: Arrow's Theorem

Geanakoplos, John. "Three Brief Proofs of Arrow's Impossibility Theorem." http://cowles.econ.yale.edu/P/cd/d11a/d1123-r3.pdf