

PSC 584: GAME THEORY

FALL 2012
MW 14:00-15:30pm
HARKNESS 329

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This course is a continuation of the first year sequence in formal theory. It offers a deeper look at standard game theory topics covered in the first year sequence, and introduces new topics and applications. It is intended as a bridge between the first year introduction to game theory and advanced seminars focusing on current research in formal theory and political economy. As such, emphasis is placed on tools that are essential for applied research in game theory along with specific applications that are particularly relevant for political science.

The prerequisite for the course is PSC 408, or an equivalent background in basic game theory. We begin with a deeper look at static games of complete information, focusing on the problem of existence of Nash equilibrium. We then introduce incomplete information first covering theory and applications of Bayesian games. We consider appropriate solution concepts for general dynamic games with an eye to accommodate models of incomplete information. We treat the theory of signaling games at some length. We take another look at repeated games and then consider key contributions in the theory of bargaining. Time permitting we will consider tools and solution concepts for stochastic games and conclude with a more rigorous treatment of models of knowledge and information.

Course Meetings: Lectures for the course will be twice weekly, Monday and Wednesday in Harkness 329, from 2:00 to 3:30.

Course Work: Game theory, as with most mathematical topics, is best learned by doing, rather than reading. Thus, there will be problem sets assigned (more or less) every other week covering the lecture material and readings. Due dates for the problem sets will be announced and late work

will not be accepted. Solutions to the problem sets will be covered in class. The components of the final grade are: final exam (40%), midterm exam (25%), problem sets (25%), and class participation (10%).

Course Readings: A lot of the material for the course will be drawn from a working draft of *Analytical Methods for Political Scientists*, Volume 2, by John Duggan and Mark Fey. Chapters from this book will be distributed in class. Additional notes by myself will be distributed when necessary.

The required text is

- *Game Theory*, by Drew Fudenberg and Jean Tirole, MIT Press.

An additional highly recommended textbook is

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

Two additional textbooks are recommended, that offer different perspectives on many of the topics we cover:

- *A Course in Game Theory* by Martin Osborne and Ariel Rubinstein, MIT Press.
- *Game Theory: Analysis of Conflict* by Roger Myerson, Harvard University Press.

Copies of all these books have been put on reserve at the library.

The topics for the course and the relevant sections in the textbooks are listed on the next page. Naturally, this schedule may change as the semester unfolds.

Topic 1 Existence of Nash Equilibrium

- Fudenberg and Tirole, section 1.2–1.3
- Gibbons, section 1.1.C & 1.3
- Nash, J. 1950. “Equilibrium Points in n -Person Games,” *Proceedings of the National Academy of Sciences USA*, 36: 48-49.
- Nash, J. 1951. “Non-Cooperative Games,” *Annals of Mathematics* 54: 286–295. (JSTOR)
- Jackson, M.O., Simon, L.K., Swinkels, J.M., and Zame, W.R. 2002. “Communication and Equilibrium in Discontinuous Games of Incomplete Information,” *Econometrica* 70: 1711–1740. (JSTOR)
- Reny, P. J. 2008. “Non-cooperative games (equilibrium existence),” *The New Palgrave Dictionary of Economics*, Second Edition. Eds. S. N. Durlauf and L. E. Blume. Palgrave Macmillan (online)

Topic 2 Bayesian Games

- Fudenberg and Tirole, ch. 6
- Gibbons, ch. 3
- Harsanyi, J.C. 1967. “Games with Incomplete Information Played by ‘Bayesian’ Players, I-III,” *Management Science*, 14: 159–182, 320–334, 486–502. (JSTOR)
- Harsanyi, J.C. 1973. “Games with randomly disturbed payoffs: a new rationale for mixed-strategy equilibrium points,” *International Journal of Game Theory* 2: 1–23.

Topic 3 Supermodular and Global Games

- Fudenberg and Tirole, section 12.3
- Vives, X. 1990. “Nash Equilibrium with Strategic Complementarities,” *Journal of Mathematical Economics* 19(3): 305–321.

- Milgrom, P. and J. Roberts. 1990. “Rationalizability and Learning in Games with Strategic Complementarities,” *Econometrica*, 58, 1255–1277. (JSTOR)
- Carlsson, H. and E. van Damme. 1993. “Global Games and Equilibrium Selection,” *Econometrica*, 61(5): 989–1018. (JSTOR)
- Morris, S. and H. Shin. 2003. “Global Games: Theory and Applications,” in *Advances in Economics and Econometrics*, Cambridge University Press.
- Ashworth S. and E. Bueno de Mesquita. 2006. “Monotone Comparative Statics for Models of Politics,” *American Journal of Political Science*, 50(1): 214-231. (JSTOR)

Topic 4 Dynamic Games and Refinements

- Fudenberg and Tirole, ch. 8
- Gibbons, section 4.1
- Selten, R. 1975. “Reexamination of the perfectness concept for equilibrium points in extensive games,” *International Journal of Game Theory* 4: 25–55.
- Myerson, R. 1978. “Refinement of the Nash Equilibrium Concept,” *International Journal of Game Theory* 7: 73-80.
- Kreps, D.M. and R. Wilson. 1982. “Sequential Equilibria,” *Econometrica*, 50(4): 863–894. (JSTOR)

Topic 5 Signaling Games

- Fudenberg and Tirole, section 11.2
- Gibbons, section 4.2
- Fudenberg, D. and J. Tirole. 1991. “Perfect Bayesian equilibrium and sequential equilibrium,” *Journal of Economic Theory* 53: 236–260.
- Michael Spence, “Job Market Signaling,” *Quarterly Journal of Economics* 87 (1973), 355–374

- In-Koo Cho and David M. Kreps, “Signaling Games and Stable Equilibria,” *Quarterly Journal of Economics* 102 (1987), 179–222
- Jeffrey S. Banks and Joel Sobel, “Equilibrium Selection in Signaling Games,” *Econometrica* 55 (1987), 647–661

Topic 6 Preplay Communication and Cheap Talk

- Gibbons, section 4.3.A
- Joseph Farrell and Matthew Rabin, “Cheap Talk,” *Journal of Economic Perspectives* 10 (1996), 103–118 (JSTOR)
- Vincent P. Crawford and Joel Sobel, “Strategic Information Transmission,” *Econometrica* 50 (1982), 1431–1451 (JSTOR)

Topic 7 Reputation

- Fudenberg and Tirole, ch. 9.
- Gibbons, section 4.3.C.
- Kreps, D. and R. Wilson. 1982. “Reputation and Imperfect Information,” *Journal of Economic Theory*, 27: 253-179.
- Fudenberg, D. and E. Maskin. 1986. “The Folk Theorem in Repeated Games with Discounting or with Incomplete Information,” *Econometrica*, 54(3): 533-554.

Topic 8 Repeated Games

- Fudenberg and Tirole, ch. 5
- Gibbons, section 2.3
- Abreu, D., P.K. Dutta, and L. Smith. 1994. “The Folk Theorem for Repeated Games: A NEU Condition,” *Econometrica* 62: 939–948. (JSTOR)

Topic 9 Bargaining

- Fudenberg and Tirole, section 4.4
- Gibbons, section 2.1.D
- Fudenberg and Tirole, ch. 10

- Rubinstein, A. 1982. “Perfect Equilibrium in a Bargaining Model,” *Econometrica* 50(1): 97–110. (JSTOR)
- Baron, D. and J. Ferejohn. 1989. “Bargaining in Legislatures,” *American Political Science Review* 83(4): 1181–1206. (JSTOR)
- Abreu, D. and F. Gul. 2000. “Bargaining and Reputation,” *Econometrica*, 68(1): 85-117. (JSTOR)
- Nash, J. 1950. “The Bargaining Problem,” *Econometrica*, 18: 155–162. (JSTOR)

Topic 10 Markov Perfect Equilibrium

- Fudenberg and Tirole, ch. 13

Topic 11 Knowledge and Equilibrium

- Fudenberg and Tirole, ch. 14