

Department of Politics and International Relations  
University of Oxford  
Formal Analysis

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**Class Time:** 9:00 to 11:00 Monday

**Class Location:** Seminar Room, Centre for Experimental Social Science, 3 George Street Mews, Nuffield College

**Class Web Site:** [www.raymond duch.com/hilary2011/formalanalysis](http://www.raymond duch.com/hilary2011/formalanalysis)

**DESCRIPTION:** The study of strategic action is central to the study of politics as politics, generally, deal with collective choice. This course aims to provide some of the basic (formal) tools used to study social interactions and apply them to the study of politics. While emphasis is placed on developing an intuitive understanding of the logic of game theoretic analysis, we will also approach the material in a rigorous fashion. At the end of the course you should be capable of reading political science literature employing game theory and be able to solve simple game theoretic models. Although the course makes some use of (simple) mathematics there are no formal prerequisites for the course. Students contemplating this class should, at a minimum, be comfortable with linear algebra and elementary statistics. A knowledge of basic calculus is helpful but not essential.

**REQUIREMENTS:** The course consists of two hour lectures each week. In each lecture I will cover each of the topics listed below. At the end of each lecture I aim to devote some time to solving problems and considering substantive application of the particular concepts/techniques that have been covered in lecture. Course assessment: Problem sets (80 percent) Final exam (20 percent). If the number of students in the course is low, a paper presentation may replace one of the problem sets

**GUIDELINES:** Learning game theory takes time and effort much like learning a new language. Indeed, an important part of learning to read game theoretic (and, more generally, formal) literature is to get used its mathematical presentation and notation. Attending lectures and reading the textbook wont be sufficient to develop the intuition that allows you to digest the literature. Only practice solving problems, and lots of it, will provide you with the required understanding. It is, therefore, important to solve all the problem sets and devote a considerable amount of time to them. Dont wait until the day before due date to work on them. Start immediately. Sometimes the solution comes to you when you least expect it unless, of course, if you havent thought at all about the problem. The problems will often seem hard, and even impossible, to solve. But dont worry, everyone struggles. However, the harder the problems you manage to solve, the more you have learned.

**READINGS:** Our coverage of the material will follow Osborne (2004). We will also be using Macartan Humphreys' Game Theory Course Notes which are available on his web site:

[http://www.columbia.edu/~mh2245/GT\\_notes05.pdf](http://www.columbia.edu/~mh2245/GT_notes05.pdf)

There are other textbooks that will also be useful for this course. Camerer (2003) provides an excellent introduction to behavioural game theory. Gibbons (1992) focuses mostly on economic applications but explains the material in a clear, intuitive manner. Morrow's text considers applications in political science Morrow (1994). Several more advanced texts also exist and those that are serious about making use of game theory in their own research would do well by taking a look at or investing in some of them. Inglehart and Klingemann (1976) is a great reference that covers a wide range of topics. Myerson (1991) is a rigorous and a comprehensive text. The same can be said for Osborne and

Rubinstein (1994). McCarty and Meirowitz (2007) is likely to become the standard text for advanced game theory within political science. It is little bit more complicated than Osborne (2004) but it is a good investment if you are serious about formal analysis. There are also a number of good book length treatments of substantive issues that apply game theoretic methods, e.g., Persson and Tabellini (2000), Acemoglu and Robinson (2005), Drazen (2000), Bueno de Mesquita and Morrow (2003), Grossman and Helpman (2001), Besley (2006).

**SCHEDULE:** This is a list of topics we aim to cover. The readings in Osborne are required. The articles listed are substantive applications of the methods that have been covered. You should take a look at them and if time permits we will discuss them in class.

**INSTRUCTION:** Felix Chow will be providing the teaching assistance. In particular, Felix will be responsible for the homework assignments.

WEEK 1: Tools for constructing and solving games

- Osborne, ch. 1
- McCarty and Meierowitz, ch. 2
- MH Game Theory Course Notes

WEEK 2: Strategic form games, Nash equilibrium, best responses, dominated strategies

- Osborne, ch. 2-3
- McCarty and Meierowitz, ch. 5.1-5.3
- Geddes (1991), JSTOR
- Snyder (1971), JSTOR

WEEK 3: Mixed strategy equilibrium

- Osborne, ch. 4
- McCarty and Meierowitz, ch. 5.4-5.9

WEEK 4: Extensive form games with perfect information, subgame perfection, backward induction

- Osborne, ch. 5-6
- Baldez and Carey (1999), JSTOR
- Krehbiel (1988), JSTOR

WEEK 5: Extensive form games cont., repeated games

- Osborne, ch. 7.1, 7.3, 7.4, 14, 15
- Fudenberg and Tirole, ch. 5
- McCarty and Meierowitz, ch. 7.1, 9

WEEK 6: Bargaining

- Osborne, ch. 16
- McCarty and Meierowitz, ch. 10
- Clinton (1994), JSTOR
- Baron and Ferejohn (1989), JSTOR

## WEEK 7: Bayesian games

- Osborne, ch. 9
- McCarty and Meierowitz, ch. 8

## WEEK 8: Extensive form games with imperfect information

- Osborne, ch. 10
- McCarty and Meierowitz, ch. 7.2

## References

- Acemoglu, Daron and James A. Robinson. 2005. *Economic Origins of Democracy and Dictatorship*. MIT Press.
- Baldez, Lisa and John M. Carey. 1999. "Presidential Agenda Control and Spending Policy: Lessons from General Pinochet's Constitution." *American Journal of Political Science* 43:29–55.
- Baron, David and John A. Ferejohn. 1989. "Bargaining in Legislatures." *American Political Science Review* 83:1181–1206.
- Besley, Timothy. 2006. *Principled Agents*. Oxford University Press.
- Bueno de Mesquita, Bruce, Alastair Smith Randolph M. Siverson and James D. Morrow. 2003. *The Logic of Political Survival*. MIT Press.
- Camerer, Collin F. 2003. *Behavioral Game Theory: Experiments in Strategic Interaction*. Princeton University Press.
- Clinton, Robert Lowry. 1994. "Game Theory, Legal History, and the Origins of Judicial Review: A Revisionist Analysis of Marbury v. Madison." *American Journal of Political Science* 38:285–302.
- Drazen, Allan. 2000. *Political Economy in Macroeconomics*. Princeton University Press.
- Geddes, Barbara. 1991. "A Game Theoretic Model of Reform in Latin American Democracies." *American Political Science Review* 85:371–392.
- Gibbons, Robert. 1992. *Game Theory for Applied Economists*. Princeton University Press.
- Grossman, Gene M. and Elhanan Helpman. 2001. *Special Interest Politics*. Princeton University Press.
- Inglehart, Ron and Hans-Dieter Klingemann. 1976. *Party Identification and Beyond: Representations of Voting and Party Competition*. John Wiley chapter Party Identification, Ideological Preference and the Left-Right Dimension among Western Mass Publics.
- Krehbiel, Keith. 1988. "Spatial Models of Legislative Choice." *Legislative Studies Quarterly* 13:259–319.
- McCarty, Nolan and Adam Meirowitz. 2007. *Political Game Theory*. Cambridge University Press.
- Morrow, James D. 1994. *Game Theory for Political Scientists*. Princeton University Press.
- Myerson, Roger B. 1991. *Game Theory: Analysis of Conflict*. Princeton University Press.
- Osborne, Martin. 2004. *An Introduction to Game Theory*. Oxford University Press.
- Osborne, Martin and Ariel Rubinstein. 1994. *A Course in Game Theory*. MIT Press.
- Persson, Torsten and Guido Tabellini. 2000. *Political Economics: Explaining Economic Policy*. Cambridge: MIT Press.
- Snyder, Glenn H. 1971. "'Prisoner's Dilemma' and 'Chicken' Models in International Relations." *International Studies Quarterly* 15:66–103.