

# POIR 615: Formal Models of Politics

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**Meetings:** Tuesdays, 2 - 4:50pm, THH 107

## Description

This course is primarily designed to teach you how to read and use the game-theoretic literature in political science (and relevant areas of economics). It will also help you to begin developing the skills necessary to analyze novel game-theoretic models. But this is not a math course and will not enable you to become a game theorist. Instead, the goal is to enable you to become a cogent consumer of game theory as it is used in the study of politics.

There are three parts to achieving this goal. First, you must learn the ideas behind how models are *analyzed*. Even if you're not going to be a practicing game theorist, if you want to be able to read and comprehend these papers, you need to have a working understanding of the concepts involved in game theory. For example, what Bayesian Perfection is and the substantive issues it creates for interpreting the solutions to models. Why multiple equilibria are a problem, and the various ways people deal with this problem. What equilibrium existence means and why it is unhelpful.

Second, you have to learn how models are *formulated*. A lot of the skepticism toward game theory in political science is driven by a misunderstanding of how and why complicated empirical phenomena are reduced by those using game theory to a deceptively simple set of assumptions. Most of the work involved in any applied game theory paper isn't the analysis of the model—it's deciding exactly HOW to model the empirical phenomenon that is being investigated. Gaining an appreciation for this process is crucial to making informed evaluations of papers that use game theory, and thus for deciding whether they are relevant to your own work.

Third, you need to understand how models are *used*. The interplay between modeling papers and those that evaluate statistical or case-based evidence is subtle, and hard to describe in the abstract. The only way to get a grip on this interplay is to work through a diverse set of examples that demonstrate the range in how models get applied in the literature. This will show you how you might be able to use the game-theoretic literature to motivate or inform your own research.

In the course of gaining these skills, we will survey some of the most influential models in political science. We will cover models from the study of American, comparative, and international politics.

This survey isn't, and isn't meant to be, comprehensive. Many of the models we'll study are foundational, in the sense that many other papers have been or will be written that extend or employ these models. So, understanding the models we cover should give you a good start toward successfully assimilating whatever other models are most relevant to your research.

I hope you enjoy it and find it useful.

**Contacting Me:** You can email me at any time, and I will try to respond within a day, though exceptions will happen. You can also set up a time to come by my office and talk, using my online calendar.

**Students with Disabilities:** Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me as early in the semester as possible.

**Academic Integrity:** Don't lie, cheat, or steal. Plagiarism is all three (think about it). Also, don't abet the bad behavior of others. Get caught doing any of these and the penalty is an F in the course, *at minimum*. For more detail, see the Trojan Integrity Guide and the related guide to avoiding plagiarism.

## Requirements

**Preparation and Participation (20%):** Careful, thorough reading of the assigned papers before class and participating thoughtfully in class are essential to the value of this course. Most meetings will be split equally between lecture and discussion.

**Exercises (30%):** Once every week or two, I will assign a problem set based on the material covered so far. You will then have one week to submit your answers. These may ask you to think critically about the game-theoretic concepts we cover, to comment on the plausibility of the assumptions used in a modeling paper, or to assess the validity of a paper's application of a model to empirical evidence. You are welcome to discuss your thinking with your classmates, but each of you must write your own answer.

**Proposal (50%):** The final assignment for this course will be to write a proposal, of no more than 3,000 words, for a research project based on modifying, applying, or testing a formal model of politics. We'll talk more about the details for this as the semester proceeds, but it will be due on December 6 (the first day of the exam period).

**Late Policy:** If you need to, you may submit one assignment up to a week late, with no questions asked as long as you email me before the deadline to let me know you'll be taking the extension. Exceptions to this policy for personal emergencies will be granted at my discretion.

## Textbooks

Given the range of mathematical backgrounds among you, no one game theory textbook would be appropriate for all of you. The books below are recommended, and listed in ascending order of assumed mathematical facility. Each of you will need at least one of these books, and it is usually better to have two, because difficulty in understanding one book's explanation of a given concept can often be eased by reading another's. The schedule of readings below lists the appropriate chapters for each week from the last two of these books. I've included a few notes below to help you choose.

- Avinash Dixit and Barry Nalebuff. *The Art of Strategy: A Game Theorist's Guide to Success in Business and Life*. W. W. Norton and Company, 2010. No math at all, just carefully explained concepts and real-life examples. You'll need this if you haven't done math since high school and didn't do AP Calculus then. It's for business school students.
- Martin Osborne. *An Introduction to Game Theory*. Oxford University Press, 2003. A little math. You should be able to handle this if you did AP Calculus in high school, or any math since. It's for undergrad econ majors. **OS**, for short.
- Nolan McCarty and Adam Meirowitz. *Political Game Theory: An Introduction*. Cambridge University Press, 2007. A lot of math, but also many good examples from politics, and very up to date. If you've had a course in college where you had to do proofs or at least use a textbook that had lots of proofs, you should be OK. If I had to recommend just one book, it would be this one: it's designed for PhD students in political science. Henceforth **MM**.

You'll also need to get a copy of a book we'll spend some time going through, as an excellent example of how models are developed and applied:

- Daron Acemoglu and James Robinson. *Economic Origins of Dictatorship and Democracy*. Cambridge University Press, 2006. Referred to as **AR**.

## Mathematical Reference

This course is primarily intended to help students become proficient at understanding and applying the game-theoretic models in common use in political science. Gaining this proficiency does not require previous experience with game theory or abstract mathematics, and you do not need to learn all the details of the mathematical techniques employed. All you really need is to become familiar with the underlying concepts of game theory. The textbooks listed above, and the lectures presented in class, should enable you to do so.

However, if you wish to actually formulate and solve your own novel game-theoretic models, it is essential that you master certain areas of mathematics. Chief among these are formal logic (i.e., learning how to specify assumptions and prove propositions), optimization theory including multivariate calculus, and basic probability theory. The books listed below cover these topics and

are recommended for students that wish to become modelers, rather than just users of models. These books should enable you to understand not only the results of game-theoretic papers, but also why these results are true and how they were arrived at. They are listed in ascending order of difficulty.

- Alpha Chiang and Kevin Wainwright. *Fundamental Methods of Mathematical Economics*. McGraw-Hill/Irwin, 2004.
- Carl Simon and Lawrence Blume. *Mathematics for Economists*. W. W. Norton and Company, 1994.
- Rangarajan Sundaram. *A First Course in Optimization Theory*. Cambridge University Press, 1996.
- Angel de la Fuente. *Mathematical Methods and Models for Economists*. Cambridge University Press, 2000.

## Schedule and Readings

Readings are to be completed by the beginning of class on the date listed. Some of the readings build in a sequence: it will be easier to understand them if you read them in the order listed.

August 22: Introduction to Theory and Modeling

*Science and theory. Theory and models. Models and math. Formulation and analysis. Rationality and rational choice. Critiques of formal political science. Irrelevance of navel-gazing. Classical, evolutionary, and epistemic game theory. What you'll learn.*

- Stephen Walt. “Rigor or Rigor Mortis? Rational Choice and Security Studies.” *International Security* 23.4 (1999): 5–48.
- Robert Powell. “The Modeling Enterprise and Security Studies.” *International Security* 24.2 (1999): 97–106.
- Herbert Gintis. “A Framework for the Unification of the Behavioral Sciences.” *Behavioral and Brain Sciences* 30.1 (2007): 1–16. [See also the subsequent critiques and author’s reply.]

## How Models Are *Analyzed*: Domestic / American Politics

August 29: Normal Games and Competitive Elections

*How to theorize about strategic interaction. Elements of a game. The normal form. Solution concept. Nash equilibrium. Models of elections.*

- **MM**, Ch. 5 (excluding 5.9–5.11)
- **OS**, Ch. 2–4

September 5: Bayesian Normal Games and Juries

*How to model uncertainty. Bayesian games. Bayesian Nash equilibrium. Models of jury voting.*

- **MM**, First read Ch. 3, Sec. 3, and then Ch. 6 (excluding 6.8)
- **OS**, Ch. 9

September 12: Extensive Games and Controlling the Agenda

*Backward induction. Dynamic games. Single-deviation principle. Romer-Rosenthal, vetoes, and overrides.*

- **MM**, Ch. 7
- **OS**, Ch. 5–8

September 19: Dynamic Games with Uncertainty and American Politics

*Perfect Bayesian equilibrium. Signaling. Fundraising, lobbying, and committees.*

- **MM**, Ch. 8
- **OS**, Ch. 10

September 26: Repeated Games and Trade Wars

*Repeated prisoner's dilemma. Grim trigger and tit-for-tat. Enforcing trade cooperation.*

- **MM**, First read Ch. 3, Sec. 5, and then Ch. 9
- **OS**, Ch. 14–15

October 3: Bargaining Theory and Relations With and Within Legislatures

*Noncooperative bargaining. Majority agreement under open and closed rules. Vetoes.*

- **MM**, Ch. 10 (excluding 10.1)
- **OS**, Ch. 16

## How Models Are *Formulated*: Comparative Politics

October 10: Prerequisites for a Theory of Political Transitions

- **AR**, Ch. 1–4.

October 17: Non-Democratic Politics

- **AR**, Ch. 5.

October 24: Democratization, Coups, and Consolidation

- **AR**, Ch. 6–7.

October 31: Social Cooperation / Building on Extant Models

- Daron Acemoglu et al. “Income and Democracy.” *American Economic Review* 98.3 (2008): 808-842.
- James Fearon and David Laitin. “Explaining Interethnic Cooperation.” *American Political Science Review* 90.4 (1996): 715-735.
- Yuhki Tajima. “The Institutional Basis of Intercommunal Order: Evidence from Indonesia’s Democratic Transition.” *American Journal of Political Science* 57.1 (2013): 104-119.

## **How Models Are *Used*: International Politics**

November 7: Bargaining Theory of War / Using Models to Improve Informal Theory

- James Fearon. “Rationalist Explanations for War.” *International Organization* 49.3 (1995): 379-314.
- Andrew Coe. “The Modern Economic Peace.” Working paper (2013).
- Kenneth Schultz. “The Politics of Risking Peace: Do Hawks or Doves Deliver the Olive Branch?” *International Organization* 59.1 (2005): 1-38.

November 14: Specific Models of War / Using Models to Understand Cases

- Muhammet Bas and Andrew Coe. “Arms Diffusion and War.” *Journal of Conflict Resolution* 56.4 (2012): 651-674.
- Hein Goemans and Mark Fey. “Risky but Rational: War as an Institutionally Induced Gamble.” *Journal of Politics* 71.1 (2009): 35-54.

November 21: NO CLASS

November 28: Models of “Irrationality” / Incorporating Psychology

- William Minozzi. “Endogenous Beliefs in Models of Politics.” *American Journal of Political Science* 57.3 (2013): 566-581.
- Jonathan Bendor et al. “A Behavioral Model of Turnout.” *American Political Science Review* 97.2 (2003): 261-280.