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| POLS 606: Advanced Research Methods for Political Scientist | Spring 2008 |
| Applied Game Theory: Formal Modeling in Political Science | Friday 9:00-11:50 |
| http://www-polisci.tamu.edu/faculty/kurizaki/ | Allen 2064 |

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Overview. This is a second graduate course on game theory in political science, with an emphasis on its application rather than advanced theory. We explore the use of formal, game theoretic models in the study of politics. The primary purpose of the course is two-fold: (1) the course will provide students with an understanding of the typical toolkit of formal modelers that are particularly useful for models of politics; (2) the course will offer selected coverage of the existing applied formal literature in political science, keeping an eye on how these tools and techniques can and have been applied to substantive problems in the study of political phenomena. Throughout the course, the emphasis will be on how to develop, solve, and analyze interesting models, and prove results.

Formal modeling is re-presentation of complex reality in a stylized form. The process is not just abstraction of a phenomenon, but creative simplification and theorization as well argumentation. The clarity, or the logical consistency, of your argument is not the sole purpose of simplification (as commonly argued); rather, valuable insights are the reason for modeling (which you may or may not obtain). That is, modeling is art more than science. The scientific (or procedural) aspect of modeling is easy to teach, but the artistic sense (or skills) of modeling is less so. While the former will be the focus of this class, I hope to cultivate the latter by working together with students.

Course structure. The course meets once per week. Since this course is “part theory, part methods” in nature, it will be “part lecture, part seminar” in format. I will begin each class session with a lecture on the topic of the week, and replicate the model and the (main) results step-by-step. We consider the choices that modelers need to make and the set of options that they have and we review approaches to constructing models and proving results.

Prerequisite/Expectations. Since this class is a follow-on to Ahmer Tarar’s Game Theory class in the fall semester, the successful completion of his class, or its equivalent, is the prerequisite for this course.¹Some background in algebra and elementary probability theory is expected. There will be only a few readings per week, reflecting the fact that students are expected to

¹Since Tarar’s game theory class uses Martin Osborne’s *An Introduction to Game Theory* as its textbook, I presume the background at the level of this book. Alternatively, the following two textbooks on game theory are at the (roughly) same level: Nolan McCarty and Adam Meirowitz. 2007. *Political Game Theory: An Introduction*. New York: Cambridge University Press; and Robert Gibbons. 1992. *Game Theory for Applied Economists*. Princeton: Princeton University Press.

engage in close reading of a model that we choose, and to be very much in command of every paper. Students may need to spend four to five times as much time on each paper as one would in a field seminar. Before the class each week, students are expected to write down the formal set-up of the model, list the assumptions and the notations used, and state (formally) the main results.

Course requirements. The primary goal of the course is to train students in the development and exposition of their own formal models, in addition to the normal “exposure to the published formal models” in the literature. Assignments will come in three forms: (1) homework assignments (30%); (2) a research paper presenting a formal model (70%); and (3) the use of scientific editors such as L^AT_EX. The first two assignments must be written using L^AT_EX.

First, there will be three short problem sets to test understanding of new concepts as we cover them. These will be due in class in Week 4, Week 7, Week 12 (subject to change). Problem sets will be handed out in class the week before they are due.

Second, over the course of the semester, each student will develop and solve his/her own model of a strategic interaction in politics. The model will be developed incrementally and made more complex as the course progresses, with the hope that the final product will be an interesting and novel contribution. Ideally, this product should contribute to your dissertation project. The paper should motivate a problem, develop a model and prove propositions, and identify testable predictions resulting from the model (i.e., empirical implications of your theoretical model). The paper itself does not have to be the final product to be included in your dissertation or to be published in a refereed journal; the idea is that the research paper will help you make a good start on your theoretical investigation. Along the process, students are recommended (but not required) to replicate and then extend a model drawn from the literature. This model does not have to be covered in the course. The idea behind the replication/extension is to help students gain complete mastery of a prominent model in the field of their choice, reproduce the derivation of the established results, then modify an important assumption and trace the implications of this modification for the results of the model. There will be several deadlines to turn in work along the way:

- Week 2: A short discussion paper no more than 3 pages long. This should include an informal description of the problem being addressed and the basic elements required for the formal set-up of the (game theoretic) model — i.e., players, actions/strategies, outcomes, and some consideration of probable preference orderings as well as information and beliefs.
- Week 3: A list of published models that you would like to replicate, build on, and/or extend for your final project.
- Week 5: Model specification.
- Week 12: Solution (equilibrium analysis).
- Week 14: Interpretation, equilibrium behavior, comparative static hypotheses, welfare analysis, etc.
- Week 15: Poster presentation in class

Topics and readings (tentative). This is a tentative list and some topics may not be covered, depending on the students’ interest. How far we get in this semester will depend on

the students' interests and backgrounds. The reading list is also tentative and only suggestive, some readings will be added while others will be dropped after the students submit their list of models in Week 3.

In addition, the following books will be helpful.

- Nolan McCarty and Adam Meirowitz. 2007. *Political Game Theory: An Introduction*. New York: Cambridge University Press.
- William Thomson. 2001. *A Guide for the Young Economist: Writing and Speaking Effectively about Economics*. Cambridge, MA: MIT Press.

Week 1 Modeling and Epistemology: Beyond Empiricism

MacDonald (2003); Clarke and Primo (2007); Morton (1999); McCubbins and Thies (1996)

Week 2 Simultaneous-Move Games: Median Voter Theorem

Black (1948); Hotelling (1929, the second model); Downs (1957, ch. 8)

Week 3 Dynamic Games and Backward Induction w/ Ordinal Preferences

Weingast (1997); Bueno de Mesquita and Lalman (1992, ch 2)

Week 4 Dynamic Games and Backward Induction w/ Cardinal Preferences

Romer and Rosenthal (1978); Acemoglu and Robinson (2006, ch 6); Morrow (1994, 17-20, 22-25)

Week 5 Incomplete information Games with Two Types: Bayes' Rule & Incentive Compatibility

Spence (1973); Morrow (1994, 226); *optional* - Jervis (1970)

Week 6 Incomplete Information Games with Continuous Types: Cut-point Strategies & Refinements

Fearon (1997); McCarty and Meirowitz (2007, 240-248)

Week 7 Incomplete Information Games with Continuous Types: Multiple Equilibria & Welfare Analysis

Kurizaki (2007); Holmström and Myerson (1983); Myerson (1991, ch 10); Akerlof (1970)

Week 8 Cheap talk

Farrell and Gibbons (1989b) (one sender and multiple receivers); Farrell and Gibbons (1989a) (pre-bargaining communication); Sartori (2005) (repeated games with pre-bargaining communication)

Week 9 Repeated Games

Grim Trigger - McGillivray and Smith (2000); Ethnic politics - Fearon and Laitin (1996); New Institutionalism - Greif, Milgrom and Weingast (1994); Milgrom, North and Weingast (1990); North and Weingast (1989); Calvert (1998)

Week 10 Bargaining 1 (plan A): Legislative Bargaining

Exogenous types - Baron and Ferejohn (1989); Banks and Duggan (2000); Merlo and Wilson (1995); Merlo (1997); Endogenous types - Austen-Smith and Banks (1988); Diermeier

and Feddersen (1998); Sequential vote buying - Groseclose and Snyder (1996); Banks (2000); Groseclose and Snyder (2000)

Week 10 Bargaining 1 (plan B): Trade Bargaining

Milner (1997, 67-83); Milner and Rosendorff (1997); McCarty and Meirowitz (2007, 275-78);

Week 11 Bargaining 2: Crisis Bargaining

Fearon (1995); Powell (1999);

Week 12 Bargaining 3: Veto Bargaining

Cameron (2000); Groseclose and McCarty (2001)

Week 13 Principal-Agent 2: Moral Hazard v. Adverse Selection

Fearon (1999)

Week 14 Information Aggregation: The Swing Voter's Curse

Feddersen and Pesendorfer (1996); Austen-Smith and Banks (1996)

Week 15 Poster Session - student presentations

References

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