

January 25, 2011

## POL 613 Game Theory for Political Science

Spring 2011

Tuesday, 9:30 - 12:30, SBS N-702

Martin C. Steinwand

Assistant Professor

Office hours: We, 1-3 pm & by appointment

SBS N-721

(631)632-6488

[martin.steinwand@stonybrook.edu](mailto:martin.steinwand@stonybrook.edu)

### Purpose

This class introduces students to basic formal approaches in rational choice theory, putting an emphasis on non-cooperative game theory. It also provides a brief refresher of optimization and probability theory, as well as an introduction to Mathematica. The covered material starts with basic concepts of rational decision making, preferences and payoff functions. It then introduces a number of equilibrium concepts, including Nash equilibrium, subgame perfection in finite and infinite games, and perfect Bayesian equilibrium. The discussion of these concepts will draw heavily on applied examples from political science. One goal of the class is to help students to incorporate game theory into their own work. To this end, students will develop their own formal models, and present their work in class.

### Course Requirements

The grade consists of three components.

1. **Homework Assignments, 30%:** There will be a homework assignment on average every other week.
2. **Presentation of Readings, 30%:** Each student will present one or two readings (dependent on class size). Goal of the presentations is to stimulate discussion, not to substitute for doing the readings. Everybody is required to come to class prepared.

Presentations are about 20 minutes in length. The presenter should identify the author's main theoretical arguments, illustrate how the formal model is used to support the argument, and highlight the strengths and limitations of the model for our understanding of the topic at hand. For example, how does the author use the model to make her/his point? Show comparative statics? Demonstrate particular equilibrium features, e.g. separating behavior in a signalling game? Does the setup adequately capture the decision making process the author is modeling? E.g. is a normal form game with complete information sufficient? What other features would be desirable? Could there be simplifications? What tradeoffs are involved in making the proposed changes?

3. **Research Paper, 40%:** Each student will develop a formal model that speaks to a topic of substantive interest to her/him. This task can be approached in several ways. I encourage you to incorporate a formal model into an existing project, for example by formalizing the theory/causal mechanism. However, the formal model must be original work done for this class. It is also possible to develop a new project that features a formal model. Every student is required to consult with me about the choice of topic.

The time-line for the research paper is as follows:

- Meet with me to talk about topic by April 8.
- Draft of complete paper due May 3.
- Student presentations on May 3 & 10.
- Final version of paper due May 23.

### Other Information

Please find other information (academic integrity notice, disability notice) at the end of the syllabus.

### Books & Software Recommended for Purchase

McM — McCarty, Nolan and Meierowitz, Adam. 2007. *Political Game Theory: An Introduction*. Cambridge.

MO — Osborne, Martin J. 2004. *An Introduction to Game Theory*. Oxford.

PO — Ordeshook, Peter C. 1986. *Game Theory and Political Theory: An Introduction*. Cambridge.

CW — Chiang, Alpha C. and Wainwright, Kevin. 2005. 4th Edition. *Fundamental Methods of Mathematical Economics*. McGraw Hill.

Ruskeepaa, Heikki. 2009. Third Edition. *Mathematica Navigator*. Academic Press.

Mathematica. Available *free* from Softweb.

## Course Outline

***Week 1, February 1, Introduction***

- Preferences
- Utility functions

Recommended readings: McM, chap. 2.; MO, chap. 1.; PO, chaps. 1.1-1.3.

***Week 2, February 8, Normal Form Games***

- Strict Dominance, Nash equilibrium in pure strategies
- Refresher: Probability theory

Recommended readings:

McM, chap. 5-5.2; MO, chap. 2, 17.6.

***Week 3, February 15, Normal Form Games, cont.***

- Expected Utility
- Nash equilibrium in mixed strategies

Recommended readings:

McM, chap. 3; MO, chaps. 4, ; PO, chaps. 1.5-1.6.

***Week 4, February 22, Best Response***

- Best response functions
- Unconstrained optimization

Required reading:

Riker, William H., and Peter C. Ordeshook. 1968. "Theory of the Calculus of Voting." *The American Political Science Review* 62:25–42.

Recommended readings: McM, chap. 5.4; MO, chap. 2.8.; CW, chap. 9

***Week 5, March 1, Constrained Optimization***

- Lagrange multipliers
- Kuhn-Tucker conditions

Required reading:

Fearon, James. D. 1995. "Rationalist Explanations for War." *International Organization* 49(3):379–414.

Recommended readings: McM, chap. 7.2.5; CW, chap. 12, 21.

***Week 6, March 8, Extensive Form Games***

- Sequential moves
- Subgame perfection

Recommended readings: McM, chaps. 7, 7.1.; MO, chap. 5.

***Week 7, March 15, Extensive Form Games, cont.***

- Credible Threats
- Tragedy of the Commons

Required readings:

Weingast, Barry R. 1997. "The Political Foundations of Democracy and the Rule of Law." *American Political Science Review* 91:245–263.

Recommended readings: McM, chaps. 7.2 - 7.4

***Week 8, March 22, Incomplete Information***

- Refresher: Conditional Probability
- Bayesian Games

Required reading:

Morrison, Kevin M. 2007. "Natural Resources, Aid, and Democratization: A Best-Case Scenario." *Public Choice* 131:365–386.

Recommended readings: McM, chap. 6; MO, chap. 9

***Week 9, March 29, Incomplete Information, cont.***

- Perfect Bayesian Equilibrium
- Costly signalling

Required reading:

Steinwand, Martin C. 2010. "Foreign Aid and Political Stability." Working Paper. Stony Brook University.

Recommended readings: McM, chaps. 8.1, 8.2; MO, chap. 10

***Week 10, April 5, Repeated Games***

- Finite & infinite time horizon
- Subgame perfection

Required reading:

Groseclose, Tim, and Nolan McCarty. 2001. "The Politics of Blame: Bargaining Before an Audience." *American Journal of Political Science* 45:100–119.

Recommended reading: McM, chap. 9.1-9.4; MO, chap. 14, 15.

**April 8, deadline for consulting with me about research paper.**

***Week 11, April 12, Repeated Games, cont. & Social Choice Theory***

- Folk Theorem
- Condorcet Paradox, Arrow's Impossibility Theorem

Required reading:

Ferejohn, John. 1986. "Incumbent Performance and Electoral Control." *Public Choice* 50:5–25.

Recommended readings: McM chap. 4.1, 4.2.; MO, chap. 8.1, 8.2; PO, chaps. 8.1, 8.2.

*April 19, Spring Break*

***Week 12, April 26, The Spatial Model***

- Median voter theorem
- The Meltzer-Richard model

Required reading:

Kayser, Mark Andreas. 2005. "Who Surfs, Who Manipulates? The Determinants of Opportunistic Election Timing and Electorally Motivated Economic Intervention." *American Political Science Review* 99:17–27.

Recommended readings: McM, chap. 5.3.; MO, chap. 8.6.; PO, chaps. 4.6, 4.7.

***Week 13, May 3, The Spatial Model, cont., & Student Presentations***

**Draft of complete research paper due in class.**

- The setter model
- Student presentations

Recommended readings: McM chap. 3.3

***Week 14, May 10, Mathematica & Student Presentations***

- Intro to Mathematica
- Student presentations

Recommended readings: Mathematica Navigator, chaps. 1,2.

**May 23, Final version of research paper due.**

**Americans with Disabilities Act**

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

**Academic Integrity**

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary>.

**Critical Incident Management**

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.