

PS/AAE 835

Game Theory and Political Analysis

Spring 2018

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Lecture Time and Location: Tuesday 1:20–3:15, 422 North Hall

Office Hours: Please see <http://scottgehlbach.net/contact/>

Course Website: Available at Learn@UW

ClassList: polisci835-1-s18@lists.wisc.edu

Overview

This course is an introduction to game theory: the mathematical analysis of strategic decision making. The bulk of the course is organized around classes of “games,” that is, representations of strategic environments. For each class of games we will develop and learn to use one or more “solution concepts,” that is, methods of deriving predictions. When possible, we will appeal to applications from political science. That said, the concepts are general, and social scientists from neighboring disciplines should find the course accessible and useful.

Along the way, we will also discuss theories of individual and social choice. A theory of individual choice is essential to any model of group choice derived from the preferences of individual actors; game theory is a general framework for building such models. Social-choice theory—the study of how individual preferences are aggregated directly into social preferences, rather than indirectly through strategic choice—is an alternative approach to modeling group choice. We study social-choice theory both because of its importance to political science in general and because of the close relationship between many results in social-choice theory and those in game theory.

Course credit

This class meets weekly for a two-hour lecture and a one-hour discussion section. It carries the expectation that you will spend at least two hours on course learning activities outside of class (e.g., reading, working on problem sets, studying for exams) for every class period. The remainder of this syllabus lists meeting times and articulates expectations for your work.

Course learning outcomes

If you give the assigned work the effort I expect, you will learn a lot in this course. By the end of the semester, you should be able to:

- Understand how individual preferences are aggregated into group preferences through voting and similar mechanisms
- Analyze strategic and extensive games of perfect and imperfect information
- Identify the game theoretic foundations of strategic arguments made informally
- Read and understand many formal-theory articles

Course requirements

There are four components to the course grade:

- Midterm exam: 35 percent
- Final exam: 50 percent
- Problem sets: 15 percent

Problem sets will be distributed every Tuesday that class meets but March 13 and May 1. They are due the following Tuesday in class, but for the problem set distributed March 6, which is due March 20, and the problem set distributed March 20, which is due April 3. Grading of the problem sets will be “coarse,” with each problem set given a check plus (exemplary effort), check (complete/good effort), check minus (incomplete/poor effort), or zero (not turned in). Despite the coarseness, and notwithstanding the small direct contribution to your final grade, by far the most important thing you can do in this course is to give yourself heart, body, and soul to the problem sets. Do not be tempted into easing back for a problem set or two, with the thought that you can catch up before the exam. This material is like a train: if you get off at one station, you will find it very difficult to get back on at the next. Do work in groups, but ideally only after you have already attempted to solve the problems on your own; the final writeup should be your own. Please see me and your teaching assistant when you have questions.

Although there is no formal participation grade, attendance in discussion section is required. Among other benefits, this is where you will learn many of the tricks used to solve problems.

In addition to regular class attendance, you are encouraged to attend the Political Economy Colloquium, which meets irregularly and jointly with one of the subfield colloquia, depending on the substantive focus of the talk. The colloquium schedule and papers to be presented are posted at <https://pec.polisci.wisc.edu>.

Reading

In contrast to many topics in political science, game theory is best taught from a textbook. There are two texts for the course, both available at the University Bookstore and elsewhere:

McCarty, Nolan and Adam Meirowitz. 2007. *Political Game Theory: An Introduction*. Cambridge: Cambridge University Press.

Osborne, Martin J. 2004. *An Introduction to Game Theory*. Oxford: Oxford University Press.

Additional readings are listed below and will be made available through the course website.

Schedule

Readings are given in *chapter.section.subsection* format.

I Individual and Social Choice

January 23—Individual Choice Under Certainty and Uncertainty

McCarty and Meirowitz 2, 3

January 30—Social Choice

McCarty and Meirowitz 4

II Strategic Games with Perfect Information

February 6—Nash Equilibrium

Osborne 2

McCarty and Meirowitz 5.1, 5.2.2, 5.6

February 13—Applications: Electoral Competition, the Commons Problem

Osborne 3.3

McCarty and Meirowitz 5.3

Dutta, Prajit K. 1999. *Strategies and Games: Theory and Practice*. Cambridge, MA: MIT Press. Chapter 7.

February 20—Mixed-Strategy Nash Equilibrium

Osborne 4.1-4.5, 4.7-4.10, 4.12

McCarty and Meirowitz 5.4, 5.13

February 27—Rationalizability and Iterated Dominance

Review Osborne 2.9, 4.4

Osborne 12

McCarty and Meirowitz 5.2.1, 5.5

III Extensive Games with Perfect Information

March 6—Subgame-Perfect Nash Equilibrium

Osborne 5, 7.1

McCarty and Meirowitz 7.1, 7.3, 7.5

March 13—MIDTERM EXAM

March 20—Application: Repeated Games

Osborne 14, 15

McCarty and Meierowitz 9

March 27—SPRING BREAK

April 3—Application: Bargaining Models

Osborne 16.1

McCarty and Meierowitz 10.2–10.4

IV Strategic Games with Imperfect Information

April 10—Bayesian Nash Equilibrium

Osborne 9.1–9.3

McCarty and Meierowitz 6.1, 6.3, 6.8

V Extensive Games with Imperfect Information

April 17—Weak Sequential Equilibrium and Perfect Bayesian Equilibrium

Osborne 10.1–10.4

McCarty and Meierowitz 8.1

April 24—Application: Signaling Games

Osborne 10.5, 10.7

McCarty and Meierowitz 8.2, 8.3, 8.6.2

VI Other

May 1—To be announced