

PS/AAE 835

Game Theory and Political Analysis

Spring 2019

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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-s19@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 12 and April 30. They are due the following Tuesday in class, but for the problem set distributed March 5, which is due March 26. 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>.

Special accommodations

The University of Wisconsin–Madison, and I personally, support the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Please inform me by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized, if you need instructional

accommodations. I will work either directly with you or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.

Reading

In contrast to many topics in political science, game theory is best taught from a textbook. The primary text for the course is:

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

You may also find the following text valuable (below I provide relevant readings in brackets):

McCarty, Nolan and Adam Meirowitz. 2007. *Political Game Theory: An Introduction*. Cambridge: Cambridge 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 22—Individual Choice

[McCarty and Meirowitz 2]

January 29—Social Choice

[McCarty and Meirowitz 4]

II Strategic Games with Perfect Information

February 5—Nash Equilibrium

Osborne 2

[McCarty and Meirowitz 5.1, 5.2.2, 5.6]

February 12—Applications: Electoral Competition, the Commons Problem

Osborne 3.3

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

[McCarty and Meirowitz 5.3]

February 19—Mixed-Strategy Nash Equilibrium

Osborne 4.1-4.5, 4.7-4.10, 4.12

[McCarty and Meierowitz 5.4, 5.13]

February 26—Rationalizability and Iterated Dominance

Review Osborne 2.9, 4.4

Osborne 12

[McCarty and Meierowitz 5.2.1, 5.5]

III Extensive Games with Perfect Information

March 5—Subgame-Perfect Nash Equilibrium

Osborne 5, 7.1

[McCarty and Meierowitz 7.1, 7.3, 7.5]

March 12—MIDTERM EXAM

March 19—SPRING BREAK

March 26—Application: Repeated Games

Osborne 14, 15

[McCarty and Meierowitz 9]

April 2—Application: Bargaining Models

Osborne 16.1

[McCarty and Meierowitz 10.2–10.4]

IV Strategic Games with Imperfect Information

April 9—Bayesian Nash Equilibrium

Osborne 9.1-9.3

[McCarty and Meierowitz 6.1, 6.3, 6.8]

V Extensive Games with Imperfect Information

April 16—Weak Sequential Equilibrium and Perfect Bayesian Equilibrium

Osborne 10.1-10.4

[McCarty and Meierowitz 8.1]

April 23—Application: Signaling Games

Osborne 10.5, 10.7

[McCarty and Meirowitz 8.2, 8.3, 8.6.2]

VI Other

April 30—To be announced