

Game Theory & Political Science (REVISED)¹²

Monday & Wednesday 3:00 PM–4:00 PM Seigle Hall Room L002

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TAs:

Peter Casey

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Office Hours: Thursdays, 10:00 AM–12:00 PM

Course Description

This course provides an overview of game theory and its applications to political science. We start from the ground floor, assuming no prior exposure to game theory or mathematics beyond high school algebra. Students are introduced to the concepts of Nash equilibrium, time-consistency, signaling, and reputation formation. These concepts will be used to study candidate competition, lobbying, roll-call voting, and intra- and inter-branch bargaining. While many of the applications of game theory that we explore will deal with political phenomena, some of our applications will be drawn from the world of economics and every-day life, due to the canonical nature such examples have played in the development of applied game theory.

This course has three objectives. The first objective is to introduce you to some of the more popular methods of solving games employed by game theorists. The second objective is to provide the necessary background for you to both appreciate and critically analyze political science scholarship employing game theoretic models. The third objective is to provide a lens through which to analyze current events and proposed reforms to the political system (e.g., campaign finance reform or the abolition of the filibuster).

¹Last updated February 3, 2013. Updates to the class schedule have been made (to address the fact that we are about one week behind the original course schedule). I've also updated the policy on missed exams to address potential conflicts from participation in university sanctioned events.

²If needed, I reserve the right to update any aspect of this syllabus. Any changes will be announced in class, and the updated syllabus will be posted to the Blackboard site for this course. It is your responsibility to learn about these changes in the event that you missed the class in which the changes were announced.

To get a broad overview of the game-theoretic concepts we will cover over the course of the semester, you might take a look at Robert Gibbon’s “An Introduction to Applicable Game Theory,” published in the *Journal of Economic Perspectives*.

Course Website

We will use Blackboard this semester. To access this course on Blackboard, log in to <https://bb.wustl.edu>. The most recent version of the course syllabus, problem sets, and required journal articles will be posted to Blackboard.

Student help for Blackboard is available at <http://sts.wustl.edu/blackboard>. There is also a free mobile app for blackboard.

Course Book

The following book is required:

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

The class textbook is available at the Wash U Book Store.

Class

This course will have a lecture format. Nonetheless, active participation is strongly encouraged. Since the lecture notes for this course will not be distributed, if you must miss a class, you should plan to get a copy of the class notes from a classmate.

Sections

This class has weekly sections. You should attend the section that you enrolled in. Sections will be used to work through the solutions to problem sets. Sections will begin Thursday, January 17th.

Thursday	9:00 AM – 10:00 AM	Seigle Hall	Room 305	Chai-yi Lee
Thursday	2:30 AM – 3:30 AM	Seigle Hall	Room 205	Chai-yi Lee
Friday	11:00 AM – 12:00 PM	Eads	Room 112	Peter Casey
Friday	12:00 PM – 1:00 PM	Eads	Room 112	Peter Casey

Attendance Policies

You are responsible for all material covered in lecture and section. That said, attendance for lectures and sections, while strongly encouraged, is not required.³

³There is once exception to this policy: You are required to attend section during the first week of class.

E-mail Policies

You can e-mail any of us anytime with any matter pertaining to this course. Under normal circumstance, we'll reply to your e-mail within 24 hours. Further, you must use your wustl account for all electronic correspondences with myself or the TAs for any matter pertaining to this course.

Office Hours

We're here to help you learn. As such, I strongly encourage you to take advantage of office hours. Office hours are one of the best resources available for learning outside of the classroom. I'm also available by appointment, as well as after class on Mondays and Wednesdays.

Course Work

1. *Problem Sets.* You are expected to complete the assigned problem sets (twelve in total). A typical problem set will have three to five "math-like" questions (some of which are multi-part). Many of the problems will be assigned from the course textbook. That said, on a handful of occasions, I may ask you to read and comment upon an academic article that employs game theory, or to read and comment upon a news analysis of current events.

Collaboration on problems sets is encouraged; however, each student must write up his or her own solutions in his or her own words. For any given problem, you should indicate any students or instructors (including myself and the TAs) that you collaborated with in coming up with the solution. You should also indicate *any* resources other than the course textbook (e.g., Wikipedia, online videos, a game-theory book, etc.) that you used in coming up with the solution.

Problem sets will be assigned at the end of class on Mondays and will be due at the end of class the subsequent Monday.

Each problem set is worth a total of 2.5 points. Your ten best problem sets will count toward your course grade.

Additional policies concerning problem sets:

- Turning in problem sets. All students unable to make it to class to turn in their problem set should e-mail an electronic version to me (jfox26@wustl.edu) *and* their teaching assistant by 4:30 PM of the Monday in which it is due. Further, all problem sets not turned in during the class which they are due must be sent via e-mail to me and your TA.

- Late problem sets. Problem sets turned in after 4:30 PM of the Monday that they are due are docked .5 points. Further, for every 24 hours past the due date which a problem set is turned in, an additional .5 points is docked. (Each problem set is worth a total of 2.5 points.)
- Homework regrade requests. In the event that you feel that an error was made in grading a problem set, you have two weeks from the day it was due to bring this error to your TA's attention. (Under normal circumstances, problem sets will be returned in section, and so this will give you over a week to make an appeal.)
- Solutions manuals. Solution manuals for the problem sets will not be distributed. Hence, it is your responsibility to make sure you understand the answer to each question. If after section, you are still not sure of what constitutes a good answer for a question, you should consult with myself, the TAs, and fellow classmates. That said, our textbook's author (Martin Osborne) has provided solutions for some of the textbook's exercises. They can be found at <http://www.economics.utoronto.ca/osborne/igt/solsp6.pdf>.

2. *Three exams.* There will be two in-class, 50 minute, midterm exams and a two-hour final exam. The first midterm will be on Wednesday, February 13th. And the second midterm will be on Wednesday, March 27th. The final will be on Thursday, May 2nd, from 6:00 PM – 8:00 PM in Seigle Hall, Room L002 (our regular class room). The final is cumulative.

Some policies concerning exams:

- Test-taking procedures. All exams are closed-book, closed-note, and electronic-devices off. The only person you are allowed to communicate with during the exam (verbally, electronically, etc.) is myself.
- Make-up policy. There will be no make-up midterm exams offered (unless one is participating in a university sanctioned event at the time of the exam). The grading policy is designed in a way that you can receive an A even when missing a midterm.

In the event of an extraordinary family or personal emergency, a make-up final may be offered (i.e., the level of emergency to qualify for a make-up final would be one that prevents you from completing all other end of semester exams or requirements). In the event that a make-up final exam is needed, a new exam will be prepared and will be administered at the start of the fall semester.

- Re-grade policy. Sometimes errors are made in grading exams. We will provide an answer key for all exams. The first step is to compare your answers to the answer key. If you still feel an error was made, you have one week from the time that I return the exam to the class to request a regrade. To request a regrade, you must return your exam to me with a written explanation as to the mistake you believe was made. I, along with the original grader of the question (which may have been myself), will then process the request and offer an written explanation as to why or why not any adjustment in the grade was made.

Calculating your Course Grade

Your final grade will be determined by your performance on your problem sets and exams. Specifically, I will calculate a “problem set score” and an “exam score.”

- Calculating the problem set score. Each problem set will be worth a total of 2.5 points. To calculate your problem set score, I'll sum the scores of your 10 best problem sets. As such, the maximal problem set score is 25 points.
- Calculating the exam score. Each midterm will be worth 25 points. The final will also be worth 25 points, but will count twice. Your exam score will be calculated by taking the sum of your three best test scores. For example, suppose you get a 23 on the first midterm, a 20 on the second midterm, and a 25 on the final. Then your set of test scores will be $\{23, 20, 25, 25\}$. In this case, I will effectively “drop” the second midterm, and your exam score will be $23+25+25=73$. Alternatively, suppose that you get a 23 on the first midterm, a 20 on the second midterm, and an 18 on the final. Then your set of test scores will be $\{23, 20, 18, 18\}$. In that case, your exam score will be $23+20+18=61$. The aim of this grading system is to incentivize learning throughout the semester while at the same time allowing for the possibility of having an off-day. Notice that the maximal exam score is 75.
- Calculating the course grade. I'll sum your problem set score and your exam score to get a total score. The maximal total score is 100 points. To calculate the course grade, I will compare your total score to grade cutoffs which will be determined after final exams have been graded. That said, a student with a total score of 94 points or more is ensured to receive at least an A. Further, any student receiving 90 points or more is ensured to receive at least an A-. Any student receiving 80 points or more is ensured to receive at least a B-. Any student receiving 70 points or more is ensured at least a C-. Any student receiving 60 points or more is ensured at least a D-.

Student taking the course credit/no-credit must receive a letter grade equivalent of C- or above.

Academic Integrity

Academic honesty is a matter taken seriously at Wash U, and a matter I also take seriously as well. Please see the university's policies concerning academic integrity at

http://provost.wustl.edu/undergraduate_student_academic_integrity.

Advice about Learning Game Theory

My advice is the following: Take good notes. Read the selected chapters from Osborne before class. When reading focus on the definitions and the illustrative examples. After class, re-write your notes and re-read the assigned readings, again focusing on the definitions and the key concepts. Time permitting, carefully work through a couple of the more involved examples in the textbook.

Immediately after a problem set is assigned, read over the problems and spend an hour or two thinking about the answers. Perhaps talk to your classmates about possible solutions to the problems sets. And upon discussing potential solutions with colleagues and/or instructors, complete the problems to the best of your ability.

Use sections and office hours to fill in any gaps in your understanding of the homework and class material. While mastering game theory, like anything else, involves hard work, the effort you put in will ultimately pay off. Game theory is an extremely useful lens through which to analyze and examine various political and economic phenomena. It also provides a systematic way by which to interrogate the consequences of reforms to the political system.

Thinking like a game-theorist takes practice. As such, it is normal to struggle a bit when confronting a new class of game or solution concept. Sometimes it is just a matter of figuring out what a piece of notation means. Other time, the problem being analyzed is truly difficult or very abstract. That said, the key ideas behind game theory can be mastered with effort and hard work.

In short, if you find yourself struggling with the material, come and see me. I will help in anyway I can.

Course Outline⁴

UNIT I: STRATEGIC INTERACTIONS IN WHICH PLAYERS MOVE SIMULTANEOUSLY

⁴While all exam dates are fixed, it is quite possible that the rate at which material is covered differs from the outline below.

Week 1: January 14 and January 16

Topics: Introduction, notation, and preferences

Readings: Chapter 1, Chapter 17 (pp. 493–499),⁵ and Chapter 2 (pp. 13–26)

Week 2: January 23

Topics: Strategic form games, Nash equilibrium

Readings: Chapter 2 (pp. 26–35)

Week 3: January 28 and January 30

Topics: Solving Nash equilibrium and best-response formulation of Nash equilibrium

Readings: Chapter 2 (pp. 35–45)

Week 4: February 4 and February 6

Topics: Weak and strict dominance, and models of candidate positioning

Readings: Chapter 2 (pp. 45–50), Chapter 3 (pp. 77–76)

Week 5: February 11 and February 13

Topics: Mixed strategy equilibrium and first midterm.

Readings: Chapter 4 (pp. 99–105, 146–150), Chapter 17 (pp. 499–505)

UNIT II: STRATEGIC INTERACTIONS IN WHICH PLAYERS MOVE SEQUENTIALLY

Week 6: February 18 and February 20

Topics: Mixed strategy equilibrium

Readings: Chapter 4 (pp. 106–128)

Week 7: February 25 and February 27

Topics: Extensive form games, subgame perfect equilibrium

Readings: Chapter 5 (pp. 106–128)

Week 8: March 4 and March 6

Topics: Bilateral bargaining with applications to inter-branch bargaining (e.g., bargaining between the

⁵Read up to section 17.5.

president and congress)

Readings: Chapter 6 (pp. 181–187) and Chapter 16 (pp. 465–480)

Week 9: March 18 and March 21

Topics: Extensive form games with simultaneous moves and/or moves by chance, with additional applications to intra- and inter-branch bargaining

Readings: Chapter 7 (pp. 205–213 and pp. 225–231)

Week 10: March 25 and March 27

Topics: Repeated games and second midterm

Readings: Chapter 14

UNIT III: STRATEGIC INTERACTIONS IN WHICH THERE IS UNCERTAINTY EITHER ABOUT THE MOTIVATION
OR INFORMATION OF OTHER ACTORS

Week 11: April 1 and April 3

Topics: Extensive games with imperfect information, weak sequential equilibrium

Readings: Chapter 10 (pp. 313–336)

Week 12: April 8 and April 10

Topics: Applications to job-market signaling and spatial policymaking

Readings: Chapter 10 (pp. 331–343), “The Welfare Effects of Minority-Protective Judicial Review,” by Fox and Stephenson⁶

Week 13: April 15 and April 17

Topics: Applications to interest group influence over policymaking; will also explore the ability of experts to influence public opinion

Readings: “Influence without Bribes,” by Fox and Rothenberg, and “Political Correctness,” by Morris⁷

Week 14: April 22 and 24

Topics: Bayesian games, Nash equilibrium of a Bayesian game, application to voting turnout and the “wisdom of crowds”

⁶Available for download at course Blackboard.

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Readings: Chapter 9