

POLSCI 3561: Game Theory for Political Scientists

Fall 2024

Class meeting:

- Monday and Wednesday from 2:30 to 3:20 p.m. in Seigle 106
- Thursday from 2:30 to 3:20 p.m. in Rudolph 203

Instructor: Amy Pond

Associate Professor

pamy@wustl.edu

Office hours: by appointment or

- Wednesday from 3:30 to 4:20 p.m. in Seigle 230G

Mentor in Teaching Experience: Aaron Du and Jie Ma

Doctoral Students

aaron.d@wustl.edu and jie.m@wustl.edu

Office hours: by appointment or

- Aaron's on Thursday from 11:00 to 11:50 p.m. in Seigle 254
- Jie's on Thursday from 10:00 to 10:50 a.m. in Seigle 275

Course Description

The course will provide an introduction to game theory, as it is used in political science and public policy. Game theorists use mathematical models to study strategic interactions, where the decision of one actor depends on decisions made by others. The course will present the fundamentals of non-cooperative game theory, including Nash equilibrium and sub-game perfection, and students will solve simple models. We will then delve into applications of game theory in political science across various sub-fields. We will for example cover the targeting of core and swing voters and protest – using models primarily from American politics. We will also discuss taxation and redistribution, as well as electoral institutions – primarily from Comparative politics, and we will cover international conflict, investment, and international agreements – from International Relations.

Prerequisites

There are no prerequisites for this course. We will use mathematical reasoning at about the level of high school algebra; no advanced coursework in mathematics is required. We will introduce and use some calculus, but you need not have had any calculus before the class. We will learn to take single derivatives.

Teaching and learning methods

Students should attend class on all days. The Monday and Wednesday classes will emphasize the introduction of new material. At the end of each Monday and Wednesday class, students will be given a problem to solve (often with multiple steps). Solutions to the problems will be collected on Thursday, and we will go over the solutions and provide more background and examples (we may switch the Monday and Thursday plan depending on how the class is progressing). The problems will help students build skills and confidence working with models. The class will be organized into

two units. The first unit will provide an introduction to the fundamentals of Game Theory. At the end of this unit, there will be one exam to assess knowledge. The second unit will provide various applications in political science. At the end of the second unit, students will complete a paper, where they develop a model application of their choice. Students will also present the paper idea and provide a peer-review in class.

Desired learning outcomes

Upon the successful completion of this course, students will be able to solve standard game theory models, to tailor these models to questions that they are interested in, to derive predictions for strategic behavior and outcomes from the models, and to discuss and present – both orally and in writing – game theoretic methods effectively.

The course will also help students think strategically and to anticipate the decisions of others. Students will learn to breakdown complex decisions into their core components and to predict how decision-making changes when preferences change.

Learning environment

It is of utmost importance that every student feels comfortable speaking in class and that we are always respectful of one another. Students with concerns, challenges or special circumstances of any sort should let me know as soon as possible.

Course Materials

Students should have one introductory textbook for reference for the course. I will primarily use the Tadelis text (see below), but other introductory textbooks are also appropriate; any of the books listed below could be used for example. The Osborne and Watson texts are also excellent. McCarty and Meirowitz present the material in a more challenging fashion, and they tailor the material to political scientists. A number of additional readings are also required; these will be available on the course site. Students are expected to have completed the reading by the day for which it has been assigned.

- Gibbons, Robert. *Game Theory for Applied Economists* (1992).
- McCarty, Nolan and Adam Meirowitz, *Political Game Theory: An Introduction* (2007).
- Osborne, Martin J. *An Introduction to Game Theory* (2004).
- Tadelis, Steven. *Game Theory: An Introduction* (2013).
- Watson, Joel. *Strategy: An Introduction to Game Theory* (2013).

If you're looking for a more advanced treatment, see Michael Maschler, Eilon Solan, and Shmuel Zamir, *Game Theory* (2020); Martin J. Osborne and Ariel Rubinstein, *A Course in Game Theory* (1994); or Drew Fudenberg and Jean Tirole, *Game Theory* (1991). For a more advanced treatment focused on politics, see Gehlbach, Scott, *Formal Models of Domestic Politics*, (2013).

Description of coursework and examination requirements

Students will complete several different assignments over the course of the term with three components: problem sets, exam, and a final paper. Final grades will be weighted in the following way.

- 10 percent – attendance and participation
- 20 percent – homework problems
- 20 percent – exam
- 10 percent – presentation of final paper idea
- 10 percent – peer review of final paper
- 30 percent – final paper

Regular attendance and active participation help us build an inclusive and productive classroom environment, where every student learns the course material and feels comfortable speaking in class.

The homework problems are assigned in each class and used to demonstrate the students' knowledge of standard game theory models and applications. Hard copies of the problems will be due in class in person on Thursdays (or Mondays). Students may work together on the problems but each student should hand in his or her own assignment; students should make sure that they understand and can solve the problems independently.

The exam assesses the ability of students to independently complete and analyze game theory problems. They will be similar in structure and content to the homework problems, and completing the problems or example problems in the Tadelis book will thus provide excellent preparation for the exam.

The paper tasks students with developing a model application. Students will demonstrate their ability to apply the concepts they have learned to a political question of their choice and to make predictions for similar interactions. The paper assignment is worth 30% of the students' final grade. In the final days of class, students will present a brief plan of where they expect to go with the paper (question and a rough outline of the model fundamentals) and they will conduct a peer-review. The presentation and peer-review are each worth 10%.

The paper should be between five and six pages in length (one inch or 2.5 cm margins, double-spaced, standard font, e.g., Times). The paper will include a political question that is situated in relevant literature and motivates the analysis (5% of the final grade; about one page; and at least five, academic citations); a theory that clearly and formally identifies the actors, strategies, and preferences or utility functions (10%, about two pages); the model solution (10%, about one page); and the derivation and discussion of comparative statics (5%, about one page). There is no need for an involved conclusion.

Course Outline

The following course outline is preliminary and subject to change. Students will be notified of any changes in class and via the course site. Readings provide guidance for students; note that similar topics are covered in the textbooks listed above. Articles are useful for guidance, but we will often cover streamlined/simplified versions of the models in the text. Do not worry if you cannot follow the models in the academic papers.

UNIT I: FUNDAMENTALS OF GAME THEORY

WEEK 1: August 26, 28, 29

Course introduction; dominance and Nash equilibrium in static (simultaneous-move) games
– Tadelis, Chapter 3, 4, 5

WEEK 2 : September 2, 4, 5

LABOR DAY IS SEPTEMBER 2 - NO CLASS

Mixed strategies and expected utility
– Tadelis, Chapter 6

WEEK 3 – September 9, 11, 12

Dynamic games (sequential-move) and sub-game perfect Nash equilibrium
– Tadelis, Chapter 7 and 8

WEEK 4 – September 16, 18, 19

Comparative statics and learning from games
– If you want a reference for intuition, you may skim the following (note that it is a far more advanced treatment than we will cover in this class): Ashworth and Bueno de Mesquita. 2005. “Monotone Comparative Statics for Models of Politics.” *American Journal of Political Science* 50(1):214-31.

WEEK 5 – September 23, 25, 26

Review for quiz

QUIZ ON SEPTEMBER 26

UNIT II: APPLICATIONS TO POLITICS OR POLITICAL SCIENCE

WEEK 6 – September 30, October 2, 3

Median voter theorem, political institutions, redistribution and taxation
– Meltzer and Richards. 1981. “A Rational Theory of the Size of Government.” *Journal of Political Economy* 89(5):914-27.
– Acemoglu and Robinson. 2001. “A Theory of Political Transitions.” *American Economic Review* 91(4):938-963.

Democracy and autocracy

— Weingast. 1997. “The Political Foundations of Democracy and the Rule of Law.” *American Political Science Review* 91(2):245-63.

WEEK 7 – October 7, 9, 10

NO CLASS ON OCTOBER 7 FOR FALL BREAK

Majoritarian versus proportional representation

– Myerson. 1993. “Efficiency of Electoral Systems for Reducing Government Corruption: A Game-Theoretic Analysis.” *Games and Economic Behavior* 5(1):118-132.

WEEK 8 – October 14, 16, 17

Public and Private good provision

– Bueno de Mesquita et al. 2003. *The Logic of Political Survival*. MIT Press: Boston, MA.

Targeting public spending: swing versus core voters

- Dixit and Londregan. 1996. “The Determinants of Success of Special Interests in Redistributive Politics.” *Journal of Politics* 58(4):1132-1155.

WEEK 9 – October 21, 23, 24

Pandering

– Canes-Wrone, Herron and Shotts. 2001. “Leadership and Pandering: A Theory of Executive Policymaking.” *American Journal of Political Science* 45(3):532-550.

Direct democracy

— Gerber, Lupia and McCubbins. 2004 “When Does Government Limit the Impact of Voter Initiatives? The Politics of Implementation and Enforcement.” *The Journal of Politics*, 66(1), pp. 43-68.

WEEK 10 – October 28, 30, 31

Protest and costly signaling

— Gause. 2022 “Revealing Issue Salience via Costly Protest: How Legislative Behavior following Protest Advantages Low-Resource Groups.” *The British Journal of Political Science* 52(1): 259-279.

Gender and candidate entry

– Ashworth, Berry, and Bueno de Mesquita. 2024. “Modeling Theories of Women’s Underrepresentation in Elections.” *American Journal of Political Science* 68(1):289-303.

WEEK 11 – November 4, 6, 7

Adverse selection

– Tadelis, Chapter 12

– Akerlof. 1970. “The Market for ‘Lemons’: Quality Uncertainty and the Market Mechanism.” *Quarterly Journal of Economics* 84(3):488-500.

Jury theorem

– Tadelis, Chapter 12

– Feddersen and Pesendorfer. 1996. “Convicting the Innocent: The Inferiority of Unanimous Jury Verdicts under Strategic Voting.” *American Political Science Review* 92(1): 23-35.

WEEK 12 – November 11, 13, 14

International investment

– Johns and Wellhausen. 2016. “Under One Roof: Supply Chains and the Protection of Foreign Investment.” *American Political Science Review* 110(1):31-51.

International cooperation on climate change

— Urpelainen. 2011. “Can Unilateral Leadership Promote International Environmental Cooperation?” *International Interactions*, 37(3): 320-339.

WEEK 13 – November 18, 20, 21

Rationalist explanations for war

– Fearon. 1995. “Rationalist Explanations for War.” *International Organization* 49(3):379-414.

Resource curse

— Ahmed. 2012. “The Perils of Unearned Foreign Income: Aid, Remittances, and Government Survival.” *American Political Science Review* 106(1):146-165.

WEEK 14 – November 25, 27, 28

NO CLASS ON NOVEMBER 27 AND 28 FOR THANKSGIVING

WEEK 15 – December 2, 4, 5

Paper presentations, December 2 and 4

Peer review December 5

FINAL PAPERS DUE – December 16 by 5 p.m.

University-Wide Guidelines & Policies

COVID-19 Health and Safety Protocols: Students experiencing symptoms consistent with COVID-19 or concerned about a possible exposure should contact Habib Health and Wellness Center (314 935-6666) to arrange for testing as indicated. If a student tests positive for Covid-19, they will receive a letter with instructions about any necessary isolation that they can share with their instructors. Any accommodation needs for COVID-related absence not covered in an instructor's standard course policies should be discussed between the student and instructor.

While on campus, it is imperative that students follow all public health guidelines established to reduce the risk of COVID-19 transmission within our community. The full set of University protocols can be found on the Health and Safety webpage.

Masking remains a valuable tool in the mitigation of COVID-19, particularly in light of new and emerging variants. Students and instructors are encouraged to treat requests to mask with care and consideration, keeping in mind that some individuals may be at a higher risk, caring for others at a higher risk, or feeling less comfortable in a mask-optional environment. Based on monitoring of regional and campus conditions, a mask requirement may be implemented as needed.

Students with disabilities for whom masked instructors or classmates create a communication barrier are encouraged to contact Disability Resources (www.disability.wustl.edu) or talk to their instructor for assistance in determining reasonable adjustments. Adjustments may involve amplification devices, captioning, or clear masks but will not allow for the disregard of mask policies should a requirement be in place.

Reporting Sexual Assault and Harassment: If a student discusses or discloses an instance of sexual assault, sex discrimination, sexual harassment, dating violence, domestic violence or stalking, or if a faculty member otherwise observes or becomes aware of such an allegation, the faculty member will keep the information as private as possible, but as a faculty member of Washington University, they are required to immediately report it to the Department Chair or Dean or directly to Ms. Cynthia Copeland, the University's Associate Title IX Coordinator, at (314) 935-3411, cmcopeland@wustl.edu. They will also offer available resources, including confidential support resources through the Relationship and Sexual Violence Prevention (RSVP) at 314-935-3445. Additionally, you can report incidents or complaints to the Office of Student Conduct and Community Standards or by contacting WUPD at (314) 935-5555 or your local law enforcement agency.

Disability Resources (DR): WashU supports the right of all enrolled students to an equitable educational opportunity, and strives to create an inclusive learning environment. In the event the physical or online environment results in barriers to the inclusion of a student due to a disability, they should notify the instructor as soon as possible.

Disabled students requiring adjustments to equitably complete expectations in this course should contact WashU's Disability Resources (DR), and engage in a process for determining and communicating reasonable accommodations. Because accommodations are not applied retroactively, DR recommends initiating requests prior to, or at the beginning of, the academic term to avoid delays in accessing accommodations once classes begin. Once established, responsibility for disability-related accommodations and access is shared by Disability Resources, faculty, and the student. Disability Resources: www.disability.wustl.edu and (314) 935-5970.

Statement on Military Service Leave: Washington University recognizes that students serving in the U.S. Armed Forces and their family members may encounter situations where military service forces them to withdraw from a course of study, sometimes with little notice. Students may

contact the Office of Military and Veteran Services at (314) 935-2609 or veterans@wustl.edu and their academic dean for guidance and assistance. See: <https://veterans.wustl.edu/policies/policy-for-military-students/>.

Preferred Name and Personal Pronouns: Washington University in St. Louis recognizes that many students prefer to use names other than their legal ones to identify themselves. In addition, in order to affirm each person's gender identity and lived experiences, it is important that we ask and check in with others about pronouns. This simple effort can make a profound difference in a person's experience of safety, respect, and support.

Emergency Preparedness: Before an emergency, familiarize yourself with the building(s) that you frequent. Know the layout, including exit locations, stairwells and the Emergency Assembly Point (EAP). Review the "Quick Guide for Emergencies" that is found near the door in many classrooms and main lobby areas of buildings for specific emergency information and instructions. For additional Information and EAP maps, visit <https://emergency.wustl.edu/>. To ensure that you receive emergency notifications, make sure your information and cell phone number is updated in SIS, and/or download the WashU Safe app and enable notifications. To report an emergency: Danforth Campus: (314) 935-5555.

Academic Integrity: Effective learning, teaching and research all depend upon the ability of members of the academic community to trust one another and to trust the integrity of work that is submitted for academic credit or conducted in the wider arena of scholarly research. Such an atmosphere of mutual trust fosters the free exchange of ideas and enables all members of the community to achieve their highest potential.

In all academic work, the ideas and contributions of others (including generative artificial intelligence) must be appropriately acknowledged and work that is presented as original must be, in fact, original. Faculty, students and administrative staff all share the responsibility of ensuring the honesty and fairness of the intellectual environment at Washington University in St. Louis. For additional details on the university-wide Undergraduate Academic Integrity policy, please see: <https://wustl.edu/about/compliance-policies/academic-policies/undergraduate-student-academic-integrity-policy/>

Resources for Students: Confidential Resources for Instances of Sexual Assault, Sex Discrimination, Sexual Harassment, Dating Violence, Domestic Violence, or Stalking The University is committed to offering reasonable academic accommodations (e.g. a no-contact order, course changes) to students who are victims of relationship or sexual violence, regardless of whether they seek a formal investigation or criminal charges. If a student needs to explore options for medical care, other services, or reporting, or would like to receive individual counseling services, there are free, confidential support resources and professional counseling services available through the Relationship and Sexual Violence Prevention (RSVP) Center. If you need to request such accommodations, please contact RSVP to schedule an appointment with a confidential and licensed counselor. Although information shared with counselors is confidential, requests for accommodations will be coordinated with the appropriate University administrators and faculty. The RSVP Center is located in Seigle Hall, Suite 435, and can be reached at rsvpcenter@wustl.edu or (314) 935-3445. For after-hours emergency response services, call the Sexual Assault and Rape Anonymous Helpline (SARAH) at (314) 935-8080 or call 314-935-6666 or (314) 935-5555 and ask to speak with an RSVP Counselor on call.

Bias Reporting and Support System (BRSS): The University has a process through which students, faculty, staff, and community members who have experienced or witnessed incidents of

bias, prejudice, or discrimination against a student can report their experiences to the University's Bias Report and Support System (BRSS) team.

Counseling and Psychological Services: Counseling and Psychological Services' professional staff members work with students to resolve personal and interpersonal difficulties, many of which can affect a student's academic experience. These include conflicts with or worry about friends or family, concerns about eating or drinking patterns, and feelings of anxiety, depression, and thoughts of suicide. Individual, Conjoint, and Group therapy are all provided in addition to referrals for off-campus support. Information can be found on the Mental Health Services webpage.

The Division of Student Affairs also offers a telehealth program to students called TimelyCare. While students are encouraged to visit Counseling and Psychological Services during business hours, this additional service also provides after-hours access to medical care and 24-7 access to mental telehealth care across the United States, with no cost at the time of the visit. 12 counseling visits are provided at no charge as well as a limited number of psychiatry appointments. Students who pay the Health and Wellness fee are eligible for this service.

WashU Cares: WashU Cares specializes in providing referrals and resources, both on and off campus for mental health, medical health, financial and academic resources by using supportive case management. WashU Cares also receives reports on students who may need help connecting to resources or whom a campus partner is concerned about. If you are concerned about a student or yourself, you can file a report here: <https://washucares.wustl.edu/>.

The Writing Center: The Writing Center offers free writing support to all Washington University undergraduate and graduate students. Staff members will work with students on any kind of writing project, including essays, writing assignments, personal statements, theses, and dissertations. They can help at any stage of the process, including brainstorming, developing and clarifying an argument, organizing evidence, or improving style. Instead of simply editing or proofreading papers, the tutors will ask questions and have a conversation with the writer about their ideas and reasoning, allowing for a higher order revision of the work. They will also spend some time looking at sentence level patterns to teach students to edit their own work.

The Center is located in Mallinckrodt and open Sunday through Thursday from 11:00 am to 9:00 pm and Friday from 11:00 am to 5:00 pm. Students are seen primarily by appointment, with walk-ins accepted as the schedule allows. They also have dedicated walk-in hours for undergraduates on Tuesday and Wednesday afternoons. Both in-person and online appointments are available. To make an appointment, go to writingcenter.wustl.edu. Email: writing@wustl.edu.

Center for Diversity and Inclusion (CDI): The Center for Diversity and Inclusion (CDI) supports and advocates for undergraduate, graduate, and professional school students from underrepresented and/or marginalized populations, collaborates with campus and community partners, and promotes dialogue and social change to cultivate and foster a supportive campus climate for students of all backgrounds, cultures, and identities. Additional Diversity and Inclusion information can be found at <https://diversityinclusion.wustl.edu/>.

Gephardt Institute: Students play an essential role in a vibrant and functioning democracy! State and local elections take place throughout the year and have a direct impact on our communities. You can register to vote, request an absentee ballot, confirm your polling location, and get Election Day reminders at <http://wustl.turbovote.org> for any of the 50 states and Washington D.C. WashU students are considered Missouri residents, and eligible student voters

can register to vote in the state of Missouri or their home state.

If you are ineligible to vote, you can participate by encouraging your friends to register and vote, engaging your peers in local issues, and taking part in other civic and community engagement activities. For more resources on voting and civic and community engagement opportunities, please visit <http://washuvotes.wustl.edu> and <http://gephardtinstitute.wustl.edu>.

University Libraries: University Libraries include seven unique locations across the Danforth Campus, but they are much more than just beautiful, quiet spaces for studying and group work. The Libraries include librarians for every discipline on campus, with the expertise to work with you to develop research ideas and find the best resources to meet your needs; or you are welcome to explore our research guides, tailored for each subject and available online. The Libraries hold five million items in the collection—print books, journals, electronic resources, databases, and millions more accessible through interlibrary loan—and you can find it all at the search on our home page. Additional resources for students include special collections, data services, citation help, digital publishing, and more. Visit the Library website for more details about these and other ways that the Libraries are here to support your academic success.