Term Information

Effective Term	Autumn 2015

General Information

Course Bulletin Listing/Subject Area	Political Science
Fiscal Unit/Academic Org	Political Science - D0755
College/Academic Group	Arts and Sciences
Level/Career	Undergraduate
Course Number/Catalog	4553H
Course Title	Game Theory for Political Scientists
Transcript Abbreviation	Game Thry Pol Sci
Course Description	Provides entry-level understanding of the basic concepts of game theory and how these concepts are applied to the study of political phenomena.
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 Week, 7 Week, 4 Week (May Session)
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade
Repeatable	No
Course Components	Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites	
Exclusions	Not open to students with credit for 4553 (587).

Cross-Listings

Cross-Listings	

Subject/CIP Code

Subject/CIP Code	45.1001
Subsidy Level	Baccalaureate Course
Intended Rank	Junior, Senior

Requirement/Elective Designation

The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes

- This course aims to give students an entry-level understanding of the basic concepts of game theory, and how these concepts have been applied to the study of political phenomena.

Content Topic List

- Fundamental game theory for undergraduate political science students
- Strict Dominance and Nash
- Sequential Games
- Imperfect and Private Information
- Perfect Bayes-Nash
- Repeated Games
- Evolutionary Game Theory

Attachments

- Syllabus 4553.pdf: 4553 current syllabus

  (Syllabus. Owner: Smith,Charles William)
- 4553HsyllabusFall2015.pdf: 4553H honors syllabus

  (Syllabus. Owner: Smith,Charles William)
- Statement of Qualitative Difference.pdf: Statement of Qualitative Difference

  (Statement of Qualitative Difference. Owner: Smith,Charles William)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Smith,Charles William	04/14/2015 02:16 PM	Submitted for Approval
Approved	Herrmann,Richard Karl	04/14/2015 02:53 PM	Unit Approval
Approved	Haddad,Deborah Moore	04/14/2015 04:17 PM	College Approval
Pending Approval	Nolen,Dawn Vankeerbergen,Bernadette Chantal Hanlin,Deborah Kay Jenkins,Mary Ellen Bigler Hogle,Danielle Nicole	04/14/2015 04:17 PM	ASCCAO Approval

Political Science 4553 *Autumn 2012 T-Th 5:30-6:50 Page Hall 10*

Game Theory for Political Scientists

Daniel Verdier, instructor

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Raphael Cunha, TA

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More and more, political scientists are using game theory to analyze strategic interactions across many different political settings. Each of the four major subfields—American, Comparative, International relations, Theory—to differing degrees, has seen game theoretic concepts enter its vocabulary, and students entering the profession will need to understand the potential and limits of game theory.

Game theory is a set of mathematical tools used to study *strategic* decision-making. Strategic decision-making is used in situations where the outcome depends on the actions of more than one actor, and hence each actor, in choosing his or her optimal course of action, must take into account the expected behavior of the other actors. Such situations arise in all areas of politics, from legislators considering what legislation to introduce and how to vote on it (keeping in mind how they expect other legislators to vote, and whether or not the president will veto it in the US case), to candidates for political office deciding which policy positions to choose (keeping in mind how they expect voters to vote based on their policy preferences), and nations deciding whether or not to attack other nations (keeping in mind how their own and the other side's allies will react). Because analyzing such situations can become complicated, verbal reasoning can easily lead to mistakes and the use of mathematics becomes very helpful.

This course aims to give students an entry-level understanding of the basic concepts of game theory, and how these concepts have been applied to the study of political phenomena. Students should leave the course with a working knowledge of games of complete information and simple games of incomplete information, to the point where they can, if not state a model correctly, at least *solve* it, and elucidate some of the theory's empirical implications.

Although game theory is not a method that is specific to political science—it was mostly developed in economics—this class will focus on a set of tools that are specific to political institutions and are not mathematically demanding. The institutions we will be examining within this course are legislatures, legislative committees, courts, and treaties, among others. Among the topics to be studied within these "institutional laboratories" are strategic voting, coalition formation, agenda setting, bargaining, and the provision of public goods. We will not use calculus or any fancy probability other than the notion of

conditional probability. You should still expect a fair amount of *algebra* (School Algebra-1 level). I will explain all notations as we go along.

This course is designed to give you a firm grounding in the included topics specifically and positive political theory generally and to serve as a launching pad for further study.

This is primarily a methods course. I will focus my attention on providing you with the *tools* to analyze strategic situations in politics, broadly defined. The policymaking examples we examine are meant to be illustrative, rather than providing the primary focus of the course. Therefore, the course is divided into sections along methods lines, not substantive policy area or institutional lines.

Reading Materials:

The only required textbook is by JOSEPH E. HARRINGTON, JR. 2009|First Edition. *Games, Strategies, and Decision Making*. New York: Worth Publishers. The book is really nice for a game theory text because it is very explanatory and yet rigorous enough. It also has tons of examples, including many from political science, which is rare for a game theory text.

Used and new copies should be available at the local bookstores or from Worth Publishers or Amazon. The first three weeks of assigned readings will be posted on Carmen to give you enough time to acquire the textbook. One copy is on reserve at Thompson.

Assignments:

The class grade has four differently weighted components: participation (11%), 6 Quizzes (24%), 4 Problem Sets (32%), and a final exam (33%).

Participation implies attendance (the roll will be taken at the beginning of each class or randomly).

Quizzes, administered through *Carmen*, will have to be completed through Carmen by the beginning of the class on the due date. Each quiz will be posted at least two days before it is due, feature a list of short-answer questions (sometimes multiple choice) destined to test your understanding of the readings assigned for that day, including substantively relevant past readings. Each quiz must be your own work.

Problem sets will be distributed at least two days before it is due; your answers will be typed (with possibly handwritten graphs, tables, or formulas), printed on paper, and handed in at the beginning of the class on the due date. Problem sets will feature a few substantive exercises. Although each of you has to turn in your own answers to each problem set, I encourage you to work on the problem sets in groups of two or three. You can learn a lot by brainstorming an issue with a peer, irrespective of how smart you are.

The final exam will have a format similar to the problem sets, except that it will take place in class, will have a closed-book format, and will be exclusively your own work.

Class Format:

The class will alternate between lectures, exercise sessions (during which you may randomly be asked to do an exercise on the board), and correction sessions.

Disability Statement:

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/

Academic Misconduct Statement:

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct at http://studentaffairs.osu.edu/pdfs/csc_12-31-07.pdf.

Aug 23, 28, Sept 4: Introduction (No class on Aug 30)

23: no readings
28: Readings: Harrington 1 and 2
4: Exercise session.

Sept 6, 11, 13, 18: Strict Dominance and Nash

Illustrations: Simple voting games, Hobbes' state of nature as a prisoner's dilemma
6: Readings: Harrington 3
11: Readings: Harrington 4. QUIZ 1 due before class.
13: Exercise session. Distribution of the 1st problem set at end of session.
18: 1st PROBLEM SET due at beginning of class; correction of 1st problem set.

Sept 20, 25, 27: More Nash, Mixed Strategies

Illustrations: Civil unrest game, the median voter theorem, the troop deployment game, nuclear deterrence
20: Readings: Harrington 5, 6 (147-157). QUIZ 2 due before class.
25: Readings: Harrington 7
27: Exercise session.

Oct 2, 4, 9: Sequential Games

Illustrations: War as a commitment problem, Cuban missile crisis, Preemption and war of attrition
2: Readings: Harrington 8. QUIZ 3 due before class

4: Exercise session. Distribution of the 2nd problem set
9: 2nd PROBLEM SET due at beginning of class; correction of 2nd problem set.

Oct 11, 16: Imperfect and Private Information

Illustrations: Terrorism, nuclear nonproliferation: Bush v. Saddam, elections as control mechanism, agenda control in the Senate, The Munich Agreement, Voting on Committees
11: Readings: Harrington 9
16: Readings: Harrington 10. QUIZ 4 due before class. Exercise session.

Oct 18, 23, 25, 30: Perfect Bayes-Nash

Illustrations: War as a result of incomplete information, Brinkmanship
18: Readings: Harrington 11
23: Readings: Harrington 11 (again)
25: Exercise session. Distribution of the 3rd problem set
30: 3rd PROBLEM SET due at beginning of class; correction of 3rd problem set.

Nov 1, 6: Perfect Bayes-Nash

Illustrations: Massive retaliation and Flexible response, Elections as selection mechanism
1: Readings: Harrington 12. QUIZ 5 due before class
6: Exercise session.

Nov 8, 13, 15, 20, 27: Repeated games

Illustrations: Social contract, the game of democratic stability, Trench warfare, pork-barrel spending, monitoring and the ABM Treaty
8: Readings: Harrington 13. QUIZ 6 due before class
13: Readings: Harrington 14
20: Exercise session. Distribution of the 4th problem set
22: 4th PROBLEM SET due at beginning of class; correction of 4th problem set
27: Readings: Harrington 15.

Nov 29, Dec 4: Review

Exercise sessions

Dec 11, 5:30-7:30pm: Final Exam

Same room

Political Science 4553H. autumn 2015. OSU

location……..

Honors Game Theory for Political Scientists

Daniel Verdier

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Office hours: time …. *or at any pre-arranged time* in 2068 Derby Hall

This course will focus on the key questions of comparative and international politics: why do states go to war, how can they deter nuclear war, how to curb nuclear proliferation, why do dictatorships exist, how democracies emerge, what makes democracy stable, what is the political rationale for terrorism, and so forth? In addition, you will be introduced to the fundamental concepts of game theory such as the Nash equilibrium, subgame-perfection, and Bayesian learning.

Game theory has revolutionized the study of politics, philosophy, economics, as well as evolutionary biology. It is also used by major investment houses, global consulting firms, and militaries worldwide to improve the effectiveness of their strategic decisions. This course will expose you to a vibrant intellectual tradition that spans many disciplines and will also give you a set of analytical tools of great practical relevance.

The course requires basic (7^{th} grade) algebra. No prior knowledge of calculus or probability theory is required. I will explain all notations as we go along.

You will read excerpts from classical texts (Thucydides' *History of the Peloponnesian War*, Thomas Hobbes' *Leviathan*, Thomas Schelling's *Arms and Influence*, and Carl Von Clausewitz's *On War*). These readings will be posted on Carmen.

You will also work on a textbook by Joseph E. **Harrington**, Jr. 2009 (there is only one edition), entitled *Games, Strategies, and Decision Making* (New York: Worth Publishers). The first three weeks of assigned readings will be posted on Carmen to give you enough time to acquire the book.

The seminar is made up of two modules: 14 lectures, using PowerPoint™, and 13 exercise/correction/review sessions, using the blackboard. Lecture notes will be posted on Carmen after every lecture.

Were you to have questions that cannot be asked during class or would you need individualized help, I am available at my office in Derby 2068 during office hours or at any pre-arranged time.

Grading:
You are expected to:

1) **attend** every class: each unmotivated absence costs 1% of the grade up to 10 absences; beyond 10, you will *not be allowed to take the final exam*. Attendance will be taken during each class (10%).

2) **participate**; participation in class will also include solving exercises on the blackboard (10 % of the grade will directly sanction the degree or quality of participation).

3) answer 6 Carmen-administered **quizzes** from home; each quiz will typically bear on the readings assigned for the upcoming lecture and must be completed before the lecture (the 6 quizzes together are worth 30% of the grade).

4) solve 5 **problem sets** at home (together worth 30%).

5) take an in-class, closed-book **final** exam (worth 20%).

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1. Introductory lecture

2. *lecture 1.* **The State of Nature** (pure strategy Nash equilibrium)

Hobbes, posted material
Harrington CH 4
QUIZZ 1 on CH 4 due before class.

3. *exercises from CH 4 and 5*

Harrington CH 5.

4. *lecture 2.* **Nuclear Deterrence** (mixed strategy Nash)

Schelling, posted material
Harrington CH 7.

5. *lecture 3.* **Civil War** (mixed strategy Nash)

QUIZZ 2 on CH 7 due before class.

6. *exercises from CH 7*

Distribution of the 1st problem set.

7. *correction of 1st problem set*

1st PROBLEM set due at beginning of class.

8. *lecture 4.* **The Social Contract** (repeated PD)

Harrington CH 13.

9. *lecture 5.* **Democratic Stability** (repeated game)

Harrington CH 14
QUIZZ 3 on CH 13 and 14 due before class.

10. *exercises from CH 13 and 14*

Distribution of the 2nd problem set.

11. *correction of 2nd problem set*

2nd PROBLEM set due at beginning of class.

12. *lecture 6.* **War as Commitment Problem** (subgame perfection)

Thucydides, posted material
Harrington CH 8.

13. *lecture 7.* **Terrorism** (subgame perfection)

Harrington CH 9
QUIZZ 4 on CH 8 and 9 due before class.

14. *exercises from CH 8 and 9*

Distribution of the 3rd problem set.

15. *correction of 3rd problem set*

3rd PROBLEM set due at beginning of class.

16. *lecture 8.* **Nuclear Non-Proliferation: The NPT** (Bayesian)

Harrington CH 10.

17. *lecture 9.* **Elections as Control Mechanism** (Bayesian)

QUIZZ 5 on CH 10 due before class.

18. *lecture 10.* **Nuclear Non-Proliferation: Bush v. Saddam** (Bayesian)

19. *exercises from CH 10*

Distribution of 4th problem set.

20. *correction of 4th problem set*

4th PROBLEM set due at beginning of class.

21. *lecture 11.* **War as a Result of Incomplete Information** (Perfect Bayesian Nash)

Harrington CH 11
QUIZZ 6 on CH 11 due before class.

22. *exercises from CH 11*

23. *lecture 12.* **Elections as Selection Mechanism** (Perfect Bayesian Nash

24. lecture 13. **Massive Retaliation and Flexible Response** (Perfect Bayesian Nash)

Clausewitz, posted material.

25. *exercises*

Distribution of 5th problem set.

26. *correction of 5th problem set*

5th PROBLEM set due at beginning of class.

27. *review*

28. *More review*

29. *final examination*

Statement of Qualitative Difference (see the 9 points below)

The ASCC Honors Panel expects that honors courses will differ from non-honors courses in a variety of ways and so requires that the proposer include a statement that addresses the following items (with particular attention to the differences between the two versions of the course, if a non-honors version exists):

1. How the specific goals of the course will be achieved.

The goals for the course are (1) having students come to class having read, understood and memorized the game theory textbook, (2) to familiarize political science students with the modeling of politics, (3) to introduce political science to students from other fields that place a greater emphasis on formal methods, (4) to convince students of either persuasion that game theory is helpful in thinking about politics, and (5) to have them solve games.

The first goal is achieved by quizzing students on the readings before class even begins—something that CARMEN makes possible.

The second goal is achieved by embedding the technology of game theory within the substantive problems that students have already encountered in their other political science courses, such as the social contract, deterrence, the causes of war, etc.

The third goal is achieved by selecting a sample of political topics---war, civil war, democracy, terrorism, deterrence, elections…--and just modeling them.

The fourth goal is achieved by pointing to the specific contribution that the modeling of an issue makes to our understanding of that issue.

The fifth goal is achieved by devoting half of the course to doing exercises together on the blackboard.

The goals of the non-honors version of the course are identical; it is the method by which they are accomplished that differs. In the honors version, I start every substantive lecture with a substantive problem (social contract, democratic stability, …), review existing answers in the field of political science, and then proceed with a game theoretic treatment of the problem, highlighting the originality of the answer. In the non-honors version of the course, I reverse the sequence: I start from the game theoretic tools assigned for that particular lecture and then apply them to substantive political problems.

2. The exposure to the basic material in the course, and ways in which added breadth and depth of material will be included.

There are two basic materials in this course: game theory and fundamental problems of political science. Game theory is used to analyze political problems, while political problems are used to teach game theory. There is no difference between the honors and non-honors versions on this count.

3. The exposure to, and use of, methodology and research techniques, and especially the ways in which the course will provide exposure to the nature of scholarship in the field.

See my answer to 2. Game theory is the method.

4. Amount and quality of work expected from students on papers, examination(s), and projects; and the method of grading that work.

Game theory is a hard topic to learn and thus to teach, especially to non-formal types. The solution is to set the right incentives: incentive to read the textbook (by taking a quiz before class on this very topic has even started), incentive to come to class, pay attention, and participate (20% of the grade), incentive to apply the freshly-learned tools (by being called to solve exercises at the blackboard, do several problem sets at home, and prepare for an in-class final).

The only difference between the honors and non-honors version is difficulty, higher in the former than in the latter.

5. The amount and kind of student/faculty contact, including how the course will offer a significant level of interaction and engagement between faculty and students, and how such engagement will be achieved.

The small size of the seminar makes interaction highly feasible. Half of the class will be devoted to doing exercises on the board, during which everyone has a chance to interact: the instructor helps the students, the students help one another; and the students also correct the mistakes made by the instructor (try to solve a math problem with your nose 1 inch away from your piece of paper and you'll see what I mean!).

6. How an environment will be fostered that facilitates intellectual exchange among students (if applicable).

Students will be invited to think through their take-home problem sets in small groups on the weekend, before writing their own separate answers.

7. Ways that creative thinking will be an essential aspect of the course requirements.

Game theory is the most counterintuitive way of thinking that I ever had to learn in political science.

8. How the course will embrace, as appropriate, interdisciplinary work and study.

The course is interdisciplinary in that it uses a method from economics to study problems of politics. It is equally attractive to political scientists who want a more formal approach to politics and non-political scientists with a formal background who want an intelligible and congenial introduction to politics.

9. Evidence of a pedagogical process that will demand a high level of intellectual output.

6 quizzes, 5 problem sets, 1 final.