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# GAME THEORETIC METHODS IN POLITICAL SCIENCE

POLS 308 (501)

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*Office Hours:* Wednesday 1–3PM

*Course Day/time:* MWF 9:45-10:35

*Course website:* Syllabus and other materials can be found at [www.ianrturner.com](http://www.ianrturner.com)

*Course location:* Allen Hall 1003

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## COURSE DESCRIPTION

Much of the world of politics involves decisions made by politicians, leaders, voters, etc. Moreover, many of these decisions are made in “strategic” situations. In this course, we will study an approach to analyzing this type of decision-making known as “rational choice.” You will learn to utilize analytical tools such as “decision theory,” “expected utility theory,” and “game theory” to analyze decision-making settings of interest to you. You will learn how strategic interactions structure the behavior of political actors — from presidents to legislators to judges to citizens trying to decide how to vote. You will also read contemporary political science research to see examples of how some of these tools have been used to further our understanding of politics.

## LEARNING OUTCOMES

By the end of the course, students should be able to:

- construct and analyze game-theoretic models to understand and explain decision-making in many political (and everyday life) environments;
- understand fundamental strategic dilemmas involved in political decision-making, and optimal solutions to those dilemmas;

- understand how suboptimal outcomes can occur in decision-making environments among rational actors, along with the incentives and institutional/structural features that can be modified to assuage suboptimal behavior and outcomes;
- construct logically coherent (i.e., logically consistent) explanations for complicated outcomes that are observed in political decision-making situations.
- utilize enhanced analytical ability to make sense of observed political outcomes.

## PREREQUISITES

The formal prerequisites for the course include completion of POLS 206, and junior or senior status or departmental head approval. Informal things to note are as follows. Game theory is mathematical. However, in this course the only math you need is high-school level algebra. This involves, for example, manipulating and solving equations and inequalities. While this is not “high level mathematics,” there will be **a lot** of algebra. If you are uncomfortable with doing algebra this may not be the course for you. Because a lot of the material will involve a lot of algebra and deductive logical reasoning it is imperative to come to class if you want to do well. The material is not easy to learn just from reading the book: asking questions, engaging in discussion, and working through examples in class will be very helpful. I will try to clarify concepts in office hours, but I **will not** recap entire class periods/lectures. That is what class is for. Garrett will lead Q&A and discussion sections on Fridays; however, Garrett’s role is to supplement material from lectures NOT re-present the material.

## COURSE MATERIALS

The book for the course is *Games of Strategy*, 4th Edition by Avinash K. Dixit, Susan Skeath, & David H. Reiley, Jr. In the course outline this book will be referenced as **DSR** (to represent the last names of the authors). Any additional readings will be distributed in class or available online. Be sure to get the correct edition of the book (4th edition) as the homework will correspond to that edition. I believe Norton (the press) has several book options (e.g., hardcover, softcover, electronic, etc.), but the textbook should be available in the University bookstore.

## COURSE REQUIREMENTS

The grading will be done according to the following rubric:

3 Exams (in class)	75% (25% per exam)
Problem Sets (HW)	25% (each HW is equal in weight)

The course is graded based on the standard 10-point scale in Table 1.

Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade
$\geq 90\%$	A	$\geq 80\%$	B	$\geq 70\%$	C	$\geq 60\%$	D	$< 60\%$	F

Table 1: Grading scale.

## EXAMS

There will be 3 in-class exams. Each exam is worth 25% of your cumulative grade. The exams will *not* be cumulative in nature. However, game theory is a discipline that builds on itself so mastering the material early on and continuing to build on a strong foundation throughout the course will be integral to satisfactory performance on subsequent exams. One exam will take place September 25th, 2015 (in class), one will take place October 30th, 2015 (in class), and the third exam will take place on the last day of class (December 9th, 2015). **There will be no make-up exams unless you have a University-approved or an instructor-approved absence.**

## PROBLEM SETS (HOMEWORK)

There will generally be one problem set per chapter (though I may combine 2 chapters for 1 problem set sometimes). The final number of problem sets will depend on how much material we get through. **I will drop your 2 lowest problem set grades.** Due to this fact I will not accept late homework assignments or assign make-up homework without a University or instructor-approved reason. Working hard on the homework assignments, reading the text, and attending class regularly should translate into good performance in the course. In addition, working hard on completing the problem sets will help to prepare you for the exams by helping you master the course material.

## CLASS PARTICIPATION

While not included in the formal grading of the course, class attendance and participation is very important to do well in this course. The format for the majority of the class sessions will typically consist of a mix of lecture and class discussion. The purpose of the lecture portion is to clarify, review, and supplement the material assigned from the textbook (or material provided by me) for that session so that all students have a working knowledge concepts relevant to the session topic.

Overall expectations for class participation include:

1. You will *prepare* for class by reading the text and any other reading material provided by me with a focus on making note of anything that you find unclear and/or particularly interesting.
2. You will *participate* in the class discussions because the benefit from these discussions is much greater when more students actively participate.

In addition, class sessions may be conducted in other formats, including, but not limited to, in-class exercises, games, and small group assignments/exercises. In general, I will lecture Mondays and Wednesdays, and Garrett will lead discussion sessions on Fridays. The discussion session is a place for you to clarify concepts you find confusing, ask questions about homework problems, and work through additional examples to refine your understanding of the material. **The best way to learn game theory is to practice doing game theory!**

## **STUDENTS WITH DISABILITIES**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Disabilities Services in Room B118 of Cain Hall, or call 845-1637.

## **ACADEMIC INTEGRITY**

Plagiarism and/or academic dishonesty will not be tolerated. The Aggie Honor Code: “An Aggie does not lie, cheat or steal, or tolerate those who do.” As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with the definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of the person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have any questions regarding plagiarism, please consult the Aggie Honor System Office website (<http://www.tamu.edu/aggiehonor>) or the latest version of the Texas A&M University Student Rules, under the section “Scholastic Dishonesty.”

## **IMPORTANT DATES**

Exam #1: September 25th

Exam #2: October 30th

Exam #3: December 9th (last day of class)

No Class: September 28th

Thanksgiving: November 25–27 (no class Wednesday or Friday that week)

## TENTATIVE COURSE TOPICS

The following outlines the general structure of the course in terms of topics to be covered. Note that this outline could change (I could add or subtract things based on many reasons). In general, however, we will try to stick as close to this structure as possible and any changes will be made abundantly clear and a revised syllabus will be made available reflecting those changes. We will likely not get through all of the topics, but they are generally ordered by priority. Time permitting we will continue through as many as make sense.

### 1. Introduction

- What is game theory and why do we care; decisions vs games; classifying games; terminology and assumptions; applications.
- Read DSR Chapters 1 and 2 and pgs. 263–267: “Appendix: Probability and Expected Utility”

### 2. Sequential move games

- Game trees; solving games using game trees.
- Read DSR Chapter 3

### 3. Simultaneous move games

- Nash equilibrium; dominance; best responses.
- Read DSR Chapters 4 and 5 but NOT 5.1

### 4. Mixed strategies in simultaneous move games

- What is a mixed strategy; beliefs and responses.
- Read DSR Chapter 7

### 5. Games with sequential and simultaneous moves

- Order effects; changes in analysis.
- Read DSR Chapter 6

### 6. Games of incomplete information

- Signaling; screening; communication.
- Read DSR Chapter 8

## 7. Strategic moves

- Credibility; commitment; credible commitments.
- Read DSR Chapter 9

## 8. The prisoners' dilemma and repeated games

- Repetition; punishment and rewards; leadership.
- Read DSR Chapter 10

## 9. Collective action

- Two player games; large groups; chicken in mixed strategies.
- Read DSR Chapter 11

## 10. Strategy and voting

- Voting rules; paradoxes; strategic manipulation; the median voter theorem.
- Read DSR Chapter 15

## 11. Brinkmanship: The Cuban missile crisis

- Cuban missile crisis; game-theoretic explanation; probabilistic threat.
- Read DSR Chapter 14

## 12. Mechanism design

- Incentives; managerial supervision; teams; multiple tasks.
- Read DSR Chapter 13

## 13. Auctions

- Auction types; winner's curse; bidding; all-pay auctions.
- Read DSR Chapter 16