Game Theory I: Introduction

ICPSR Summer Program, First Session, 2017

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Course Purpose and Design:
Strategic concerns underpin social and political settings. As such, a basic understanding of strategic choices enhances one’s understanding of our social and political environs. This course introduces fundamental concepts and tools for understanding basic game theory.

The formal analysis inherent to game theoretic methods is deductively structured and logically based. No advanced mathematical background is presumed for this course. Some set theory and calculus will be introduced. For students with limited background, this course is a great introduction. Those students with some familiarity with game theoretic tools will have a chance to refine those tools.

The course has three goals. Our first goal is to become comfortable with the basics. Our second goal is to understand the application of game theoretic tools to various settings. Our third goal is to begin the development of our own applications of the tools and techniques discussed. The careful application of formal work will be a prominent concern throughout the course.

Key Concepts Covered in the Course Include:
At the broadest level, we will cover cooperative game theory & noncooperative game theory and equilibrium concepts associated with cooperative and noncooperative game theory.

Reading Material:
The main text is Joel Watson’s *Strategy: An Introduction to Game Theory, 3rd Edition*. Recommended selections will be drawn from McCarty and Meirowitz’s (McC/M) *Political Game Theory* and Gelbach’s *Formal Models of Domestic Politics*. Other readings are available electronically. Generally, the electronic articles apply game
theoretic tools to specific social or political settings. Our discussion of the substance of the applications will be limited, and we will not vouch for the meaningfulness of substantive applications. Instead, for the articles, we will focus on the development of the game theoretic model.

**Lecture Style:**
I will use slides, but there will also be considerable board time.

**Grading:**
Grades are based on homework (@75%) and a final (@25%). The final is structured like a bigger homework. Homework assigned toward the middle of the week (Tu or W) will be due on Friday. Homework assigned at the end of the week (Th or F) will be due on Monday.

I try to reserve some time on a couple of Fridays for discussions in smaller groups.

For those of you new to ICPSR, the pace is fast and the work is intensive – for participants, TAs, and instructors.

**Syllabus and Course Structure**
This course has @18 days. We will not meet on the 4th of July. The final will be due on the last day of classes. We are left with @17 two-hour days. This syllabus is our best estimate of what we’ll cover and when we’ll cover it.

*Note:* Watson’s chapters are very short. The McCarty and Meirowitz (McCM) chapters are longer and more advanced. Gelbach is more conceptually oriented. Other reading assignments will be selected from the syllabus as we proceed.

**Day 1:** As with other tools for the social sciences, game theory characterizes people.

**Characterizing People: An Introduction to Preferences & Utility**

- Watson Ch. 1
- McCM Ch. 2

*Recommended:*

- Luce and Raiffa’s *Games and Decisions* Ch. 2
Day 2: As a tool for the social sciences, game theory also characterizes interactions between people.

**The Features of Social or Political Settings that Create a Game**
Characterizing Choices and Outcomes for Extensive and Normal Form Game Forms

Watson Ch. 2, 3, 4, 5, & 14

Days 3 & 4: Game theory also characterizes the outcomes from interactions.

**Equilibrium Concepts**

Watson Ch. 4, 5, 6, 7, 9, 11, 12, & 15

McCM Ch. 5 & 7

Day 5:

**Equilibrium Concepts, cont.ed**

Watson Ch. 8, 9, 10, 11, 14, & 15

Gelbach Ch. 1

Days 6 & 7: Looking ahead to think back.

**Applications with Subgame Perfection**


**Days 8 & 9:** Considering beliefs and the connections between beliefs and actions. Are all beliefs reasonable? Can any action be justified?

**Perfect Bayes**

Watson Ch. 24, 26, & 28

McCM Ch. 8


**Days 10 & 11:**

**Introducing Signals**

McCM Ch. 8


**Days 12 & 13:**

**Introducing Cooperative Game Theory and Bargaining Models**

Luce and Raiffa’s *Games and Decisions* Ch. 8, 9

Skim Ordeshook’s *Game Theory and Political Theory* Ch. 7, 8, 9

**With Guidance from “Accepted Principles:” The Nash Bargaining Solution**

Watson Ch. 18

Luce and Raiffa’s *Games and Decisions* Ch. 6

**Another look at bargaining**

Watson Ch. 19


**Day 14:**

**Applications of Cooperative Games**


Days 15 & 16:
Simple Games to Re-Introduce Preferred to Sets and Win Sets


Gelbach Ch. 4


Day 17:

Repeated Games v. Dynamic Games

Watson Ch. 22


Day 18:

Wrap-up and Final
By the end of this course, the following concepts will have been introduced.

backward induction, Bayes’ theorem, beliefs, Cartesian product, cheap talk, complete information, cooperative game, core, coordination, directed graph, dominance, dominate, edge, extensive form game, focal point, imputation, incomplete information, information set, iterated dominance, intuitive criterion, mapping, mixed strategy, mixed strategy equilibrium, Nash Bargaining Solution (NBS), Nash equilibrium, nature, node (including initial & terminal), non-cooperative game, normal form game, pareto, perfect Bayes, player, pooling, preferred-to-sets, rationalizable, repeated game, separating, sequential rationality, strategic form game, strategy, subgame, subgame perfection, tree, types, utility, v-set, yolk, win sets, zero sum