Game Theory 2

Winter, 2025

Instructor:
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Teaching Assistant:
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Class time and location: Fridays, 9:30–12:20, Pick 506
Office hours: Nalepa: Monday 1:30-3 pm, Pick 524A; Yi: Wednesdays 3:30–4:30

Disclaimer

This syllabus is subject to minor ongoing revision. I will adjust as necessary, depending on how long specific topics take.

Description

This course is the second part the two-quarter sequence of game theory. Its purpose is to help students understand established techniques to solve games of incomplete information and have a sense of how to apply these techniques in their own research. Familiarity with games of complete information is assumed, although we will review it in the first three weeks of class.

Requirements

You are required to attend all lectures, during which techniques necessary for solving the problem sets will be introduced. Additional, strictly mathematical skills will be developed during Shuyi's first three office/lab hours. These sessions will be devoted to calculus, optimization, and integration. Although participation is not obligatory, you are strongly encouraged to attend these sessions.

In addition to two large problem sets, each student is required to write a research proposal due at the end of the quarter. The proposal will set up a game-theoretic model about a real-world political scenario and explain why the model is parsimonious for that scenario. We encourage but do not require you to solve the model. We do require, however, that you provide a complete description of the model, which means that, depending on the model, you will have to define, players, strategies, preferences, beliefs, and a solution concept. The proposal should be strictly less than 10 pages (double spaced, font size 12). In the last two sessions of the course, students present their proposals.

Overleaf

You are required to compile problem sets and the proposal in latex. You are responsible for mastering the use of the Latex editor of your choice. We highly recommend the help files provided by "Overleaf", a free online platform. Using this software is a skill that will come in handy in future academic and non-academic work.

Assessment

1. Large Problem Set I (25%. Due February 1).
2. Research proposal (25%).
3. Class participation (5%).
3. Presentation (20%).
4. Large Problem Set II (25% Due March 10).

Reading

The are five recommended texts for this course:

- Osborne, Martin. 2004. *An Introduction to Game Theory.*
- Fudenberg and Tirole. 1990. *Game Theory* (out of print, but we will place it on relevant chapters on reserve)
- Tadelis, Steven. Game Theory: An Introduction. Princeton University Press, 2013.
- Aliprantis, Charalambos D., and Subir K. Chakrabarti. Games and decision making. Vol. 2. New York: Oxford university press, 2000. We will cover chapters 4 onward.
- Nalepa, Monika and Barbara Piotrowska. *Blue Purge: Loyalty and Competence of Authoritarian Agents of Repression.* 2024 (note: we will only cover a couple of chapters from this book and they will be shared with you.)

Osborne (2004) contains a lot of examples and is good for developing an initial understanding of game theory.

Tadelis is a slightly more advanced textbook and uses optimization.

Aliprantis and Chakrabarti are a user friendly textbook that also covers cooperative games.

The book by Nalepa and Piotrowska contains applications of game theory to political science and, specifically, to regime transitions. Moreover, if you are interested in knowing the mathematical rigor of game theory, consider purchasing

- Mas-Colell, Andreu, Michael Whinston, and Jerry Green. 1995. *Microeconomic Theory.*

Schedule

January 10 : Review of SPE

- The relationship between NE and SPE
- Finite horizon games and backward induction
- Finding SPE analytically (not through BI)
- Extensive Form Games with simultaneous moves

Assignments:

- Osborne 5.4–5.5
- ex. 173.4 (Osborne) & 176.2 (Osborne)

January 17: SPE applications

- Stackelberg duopoly
- Fair division
- Standard principal agent model
- Delegation to bureaucrats

Assignments:

- Osborne 6.1 & 6.3.
- ex. 183.1 (Osborne) & 187.1

January 24: Moral hazard and optimal contracts

- Perfect and imperfect info case of optimal contracts
- Continuum of effort levels
- Tournaments
- (if we have time) Behavioral strategies in solving sequential games

Assignments: TBD

January 31: Bargaining

- Nash solution
- Bankruptcy
- Shapley value
- 2-person sequential bargaining

Assignments: TBD

Febraury 7: Repeated games: PD and other games

- Finitely and infinitely repeated PD
- NE and SPE of general infinitely repeated games
- SPE of infinitely repeated games, the one-deviation principle
- Folk theorems for NE for finitely repeated games
- Extensions of the ultimatum game
- Infinite horizon bargaining model with impatient players

Assignments:

- Osborne 14.1-14.10,15.1-15.3
- ex: 426.1, 428.1, 430.1 & 433.1 (Osborne) [pick 2]

February 14: Incomplete Info: introduction

- Bayes Rule Refresher using Transitional Justice Example
- Regime change and the Harsanyi transformation

Assignments:

- Osborne 10.1 – 10.5 & 10.7- 10.9, Nalepa and Piotrowska: "Clean sweep or picking out the 'bad apples': the logic of secret police purges with evidence from Post-Communist Poland."
- Ex. (Osborne): 335.2

February 21: Incomplete info in extensive form: sequential rationality

- Costly signaling: Wise Guys and Hipsters and LIC Diner
- Job market signaling
- Cheap talk

Assignments:

- Crawford, Vincent P., and Joel Sobel. "Strategic information transmission." Econometrica: Journal of the Econometric Society (1982): 1431-1451.
- ex: 452.3,454.2, 459.3 (Osborne) [pick 2]
- ex: 468.2, 473.2 & 488.1 (Osborne) [pick 2]

February 28: Presentations Part 1

- Presentations A-M

Assignments: TBD

March 7: Presentations Part 2

- Presentations N-Z

Assignments: TBD