

Faculty of Liberal Arts and Professional Studies
Department of Economics
Econ 4130: Game Theory
Winter 2023

Class information:

- Time and location: Winter 2023, Monday 11:30-2:30 pm, HNE 037
- Course Webpage: <https://eclass.yorku.ca/course>
- Prerequisite: (Enforced) AP/ECON 1530 3.00 and AP/ECON 1540 3.00 or equivalents.
(Advisory) AP/ECON 2300 3.00

Course Description

Game theory is the study of strategic interactions, where economic agents (or “players” in a “game”) affect each other through their actions and make their decisions in light of what others are likely to choose. This course provides an introduction to game theory and strategic thinking at the undergraduate level. One fundamental puzzle is how players can cooperate when each of them faces an incentive to cheat the others. For example, why would a producer exert effort to produce a quality product if the consumer cannot verify the quality until after purchase? Why would people contribute time and effort to community projects when they could relax and let others do the work? Game theory provides a unified framework for addressing these questions. By formalizing the situations that players face, we can trace the logical implications of our assumptions on players’ preferences, beliefs, and methods of reasoning. Game theory is a core tool of modern economics, and also yields useful insights into business strategy, political science, computer science, sociology, biology, and other fields. In this advanced course, students should be comfortable with rigorous definitions, logical reasoning, probabilities, and optimization using calculus.

Instructor: Yishu Zeng

- E-mail address: zengyish@yorku.ca
- Office Hour: 2:30-3:30 pm, Monday and Friday, Vari Hall 1094

Graduate student instructor: TBA

- E-mail address: TBA

Note: Please kindly indicate “Econ 4130” in the subject of your email when contacting me or our GSI; it will help us to manage all your emails more efficiently.

Textbooks and Course Material

The required textbook is:

Joel Watson, Strategy: An Introduction to Game Theory, 3rd edition, 2013

You are also encouraged to read other excellent textbooks such as “An Introduction to Game Theory” by Martin Osborne and “Game Theory for Applied Economists” by Robert Gibbons.

Problem Sets

There will be ten to twelve problem sets. Approximately every week, a new problem set with a due date will be posted on eClass. Usually it will be posted on Monday and it is to be submitted online by the end of Sunday in the same week. You are encouraged to work on the problem sets together but you have to write up and submit your own solutions. **Late problem sets will have a 50% penalty.**

Exams and Grades

The problem sets will account for 15% of your final grade. In addition, you may drop one lowest grade of the problem sets. There will be two midterm exams and a final exam. Each midterm accounts for 20% of your final grade. The final exam will account for 40% of your final grade. All the exams are closed book. I will also send out some surveys to learn about your opinions/concerns/comments. These surveys are part of the class participation and will account for 5%. Grades are assigned based on the weighted average credit (P%) achieved in class.

Midterm 1: February 13, Monday in class (right before the reading week)

Midterm 2: March 20, Monday in class

Final: TBA

Tentative Course Plan:

Lecture material is organized by unit numbers, on the left. Units do not precisely correspond to class meetings. In some class meetings we will cover parts of two or even

three units, and some units will be spread over two or even three class meetings. We will cover all of Parts I–IV, and as much of Part V as we can.

The two midterm exams are scheduled for approximately the ends of Part II and Part III, but we might go faster or slower through those parts depending on how the class progresses. Regardless of the progress we make, the midterm exams will be held as scheduled. Textbook readings for each unit are shown in parentheses.

- **Part I: Representing Games**

- Extensive form (chs. 1-2)
- Normal form (ch. 3)
- Tools (ch. 4, “the concept of efficiency” from ch. 6)

- **Part II: Static Settings**

- Dominance (“rationality” from ch. 5, “dominance” from ch. 6)
- Rationalizability (“common knowledge” from ch. 5, chs. 7–8)
- Cognitive hierarchies (“best response” from ch. 6)¹
- Nash equilibrium (chs. 9–10)²
- Mixed strategy Nash equilibrium (ch. 11)
- Applications of Nash equilibrium (chs. 12–13)

- **Part III: Dynamic Settings**

- Subgame perfection (chs. 14–15, review ch. 2)
- Applications of subgame perfection (chs. 16–17)
- Bargaining (chs. 18–19)
- Negotiation equilibrium (chs. 20–21)
- Repeated games (chs. 22–23)

- **Part IV: Incomplete Information**

- Bayesian Nash equilibrium (ch. 24, 26)
- Lemons & Auctions (ch. 27)

¹By now you should also have read the rest of chs. 5–6.

²You should skip “congruous sets” in ch. 9.

- Perfect Bayesian equilibrium (ch. 28)
- Negotiation equilibrium (chs. 20–21)
- Reputation (ch. 29)
- **Part V: Fun topics (These topics are not covered in the textbook.)**
 - Information aggregation
 - Cheap talk
 - Mechanism design

Important Class Rules

All students are expected to familiarize themselves with the following information, available on the Senate Committee on Academic Standards, Curriculum & Pedagogy webpage (see Reports, Initiatives, Documents). Link: <http://secretariat-policies.info.yorku.ca>

- Senate Policy on Academic Honesty and the Academic Integrity Website
- Ethics Review Process for research involving human participants
- Course requirement accommodation for students with disabilities, including physical, medical, systemic, learning and psychiatric disabilities
- Student Conduct Standards
- Religious Observance Accommodation