

ECON5160 Game Theory

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Department of Economics
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Course Description

This course focuses on game theory and its applications in economics. The first part is theory and introduces solution concepts in strategic and extensive games of complete or incomplete information. The second part covers various applications, including oligopolistic competition, auction, and matching. The course evaluation will be based on a midterm exam on theoretical aspects of game theory and a student presentation on related applied papers.

Learning Outcomes

After completing this course, the students are expected to:

1. Acquire advanced knowledge in game theory;
2. Develop skills in game theoretic modeling and analysis;
3. Obtain preparations for conducting independent research in game theory.

Main Textbook

(Theory) Michael Maschler, Eilon Solan, and Shmuel Zamir, *Game theory*, Cambridge, 2020

(Applications) David M. Kreps, *Microeconomic Foundations II*, 2023

I will make the lecture materials as self-contained as possible. Of course, you can consult your favorite game theory textbook if you have one.

Further Readings

1. D. Fudenberg and J. Tirole, *Game theory*, MIT, 1991.
2. M. Osborne and A. Rubinstein, *A course in game theory*, MIT, 1994.

Assessment Scheme

The course grade will be determined by a midterm exam (50%) and a student presentation (with a referee report) (50%). Grade assignments will be based on the following descriptors.

Grade	Descriptor
A / A-	Outstanding/Generally outstanding performance on all learning outcomes.
B+ / B / B-	Substantial performance on all learning outcomes, OR high performance on some learning outcomes which compensates for less satisfactory performance on others, resulting in overall substantial performance.
C+ / C / C-	Satisfactory performance on the majority of learning outcomes, possibly with a few weaknesses.
D+ / D	Barely satisfactory performance on a number of learning outcomes
F	Unsatisfactory performance on a number of learning outcomes, OR failure to meet specified assessment requirements.

Academic Honesty

Attention is drawn to University policy and regulations on honesty in academic work, and to the disciplinary guidelines and procedures applicable to breaches of such policy and regulations. Details may be found at <http://www.cuhk.edu.hk/policy/academichonesty/>

Course Outline (tentative)

Week	Date	Topics	Assigned Reading	Note
1	Jan 7	Strategic-form Games	Ch.4	Weeks 1-7 use MSZ
2	Jan 14	Mixed Strategies	Ch.5	
3	Jan 21	Extensive-form Games	Ch.3 Ch.6	
4	Feb 4	Equilibrium Refinement (SPE and SE)	Ch.7	
5	Feb 11	Bayesian Games	Ch.9 Ch.10	
6	Feb 18	Bayesian Games (cont'd)	Ch.9 Ch.10	
7	Feb 25	Repeated Games	Ch.13	
8	Mar 4	Midterm Exam		120 min, closed-book
9	Mar 11	Oligopoly Student Presentation 1	Ch.18 Ch.22	Weeks 9-14 use Kreps
10	Mar 18	Moral Hazard Student Presentation 2	Ch.19	
11	Mar 25	Adverse Selection & Signaling Student Presentation 3	Ch.20	
12	Apr 1	Bargaining Student Presentation 4	Ch.23	
13	Apr 8	Auction Student Presentation 5	Ch.24	
14	Apr 15	Matching Student Presentation 6	Ch.25	

Suggested Papers for Presentation

Oligopoly

1. Green, E. J., & Porter, R. H. (1984). Noncooperative collusion under imperfect price information. *Econometrica: Journal of the Econometric Society*, 87-100.
2. Abreu, D., Pearce, D., & Stacchetti, E. (1986). Optimal cartel equilibria with imperfect monitoring. *Journal of Economic Theory*, 39(1), 251-269.
3. Skrzypacz, A., & Hopenhayn, H. (2004). Tacit collusion in repeated auctions. *Journal of Economic Theory*, 114(1), 153-169.
4. Harrington, J. E., & Skrzypacz, A. (2011). Private monitoring and communication in cartels: Explaining recent collusive practices. *American Economic Review*, 101(6), 2425-2449.
5. Harrington Jr, J. E., & Skrzypacz, A. (2007). Collusion under monitoring of sales. *The RAND Journal of Economics*, 38(2), 314-331.

Moral Hazard

1. Holmstrom, B., & Milgrom, P. (1987). Aggregation and linearity in the provision of intertemporal incentives. *Econometrica: Journal of the Econometric Society*, 303-328.
2. Carroll, G. (2015). Robustness and linear contracts. *American Economic Review*, 105(2), 536-563.
3. Levin, J. (2003). Relational incentive contracts. *American Economic Review*, 93(3), 835-857.
4. MacLeod, W. B. (2003). Optimal contracting with subjective evaluation. *American Economic Review*, 93(1), 216-240.
5. Holmstrom, B., & Milgrom, P. (1991). Multitask principal-agent analyses: Incentive contracts, asset ownership, and job design. *The Journal of Law, Economics, and Organization*, 7(special_issue), 24-52.

Adverse Selection & Signaling

1. Kamenica, E., & Gentzkow, M. (2011). Bayesian persuasion. *American Economic Review*, 101(6), 2590-2615.
2. Stiglitz, J. E., & Weiss, A. (1990). Sorting out the differences between signaling and screening models.
3. Milgrom, P. R. (1981). Good news and bad news: Representation theorems and applications. *The Bell Journal of Economics*, 380-391.
4. Dye, R. A. (1988). Earnings management in an overlapping generations model. *Journal of Accounting research*, 195-235.

Bargaining

1. Rubinstein, A. (1982). Perfect equilibrium in a bargaining model. *Econometrica: Journal of the Econometric Society*, 97-109.

2. Abreu, D., & Gul, F. (2000). Bargaining and reputation. *Econometrica*, 68(1), 85-117.
3. Cramton, P. C. (1992). Strategic delay in bargaining with two-sided uncertainty. *The Review of Economic Studies*, 59(1), 205-225.
4. Binmore, K., Rubinstein, A., & Wolinsky, A. (1986). The Nash bargaining solution in economic modelling. *The RAND Journal of Economics*, 176-188.

Auctions

1. Bulow, J., & Roberts, J. (1989). The simple economics of optimal auctions. *Journal of political economy*, 97(5), 1060-1090.
2. Crémer, J., & McLean, R. P. (1988). Full extraction of the surplus in Bayesian and dominant strategy auctions. *Econometrica: Journal of the Econometric Society*, 1247-1257.
3. Komo, A., Kominers, S. D., & Roughgarden, T. (2024). Shill-proof auctions. *arXiv preprint arXiv:2404.00475*.
4. Ausubel, L. M. (2004). An efficient ascending-bid auction for multiple objects. *American Economic Review*, 94(5), 1452-1475.
5. Kagel, J. H., & Levin, D. (1986). The winner's curse and public information in common value auctions. *American economic review*, 76(5), 894-920

Matching

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