

Game Theory

(2021037001)

Course Syllabus

Winter 2020

2 credits

Time: Wed., 8:50-12:15
Room: Zijingang West 2-403
Instructor: Dr. Qingwei Jin
Department of Data Sciences and Engineering Management
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Office Hour: Thur. 9:00-11:00 or by appointment

Course Description:

Game theory is widely studied and applied in economics, politics, public administration, business administration, marketing and operations management. This course aims to provide some basic knowledges of game theory for students. The course starts with concepts and formulations such as players, utilities, payoffs, actions, strategies, information, strategic and extensive forms. After that, several equilibria like Nash equilibrium, subgame perfect Nash equilibrium, Bayesian equilibrium are introduced along with static game and dynamic game under the complete and incomplete information conditions. By using these concepts and results, we will discuss several topics including signaling, bargaining, auctions and pricing. After introducing these noncooperative games, we will also provide basic concepts and results of cooperative games. The students are expected to understand the ideas in game theory, to use these results to model and explain phenomena in their areas, to find strategies which could be used in solving their problems and to consider ethical issues during decision-making.

Textbooks and References:

1. Rasmusen, E. (2007). *Games and information: an introduction to game theory*. Fourth Edition. Blackwell Publishing Ltd.
2. Myerson, R. B. (1991). *Game theory: analysis of conflict*. Harvard University.
3. Fudenberg, D., & Tirole, J. (1991). *Game theory*. MIT Press.
4. Osborne, M. J. (2003). *An introduction to game theory*. Oxford University Press.

5. Peleg, B., & Sudhölter, P. (2007). *Introduction to the theory of cooperative games*. Second Edition. Springer.
6. Cachon, G. P., & Netessine, S. (2006). Game theory in supply chain analysis. *Tutorials in Operations Research: Models, Methods, and Applications for Innovative Decision Making*, 200-233. (Available at: <http://pubsonline.informs.org/doi/abs/10.1287/educ.1063.0023>)
7. Other reading materials will be distributed in class or sent by email.

Requirements:

The requirements in this course are divided into two parts:

- 1) The knowledge about game theory
- 2) Use of game theory to analysis problems in practice, especially problems regarding ethical issues during decision-making.

Grades are given accordingly.

You will be expected to be in class every Monday and Wednesday. If you miss an in-class session:

- a. It is YOUR RESPONSIBILITY to find out what happened in class and to be fully prepared for the next class session.
- b. You will be expected to hand in any assignments that are due before the next session starts.
- c. If you are unable to turn things in on time, it is your responsibility to talk to the instructor.

Grade:

1. Participation (10%)
2. Homework assignments (50%)
3. Final Exam (40%)

Course Outline:

No.	Topics	Readings
1	The rules of the games	Ch1 in Rasmusen
2	Information	Ch2 in Rasmusen
3	Mixed and continuous strategies	Ch3 in Rasmusen
4	Dynamic games with symmetric information	Ch4 in Rasmusen
5	Reputation and repeated games with symmetric information	Ch5 in Rasmusen

6	Dynamic games with incomplete information	Ch6 in Rasmusen
7	Moral hazard	Ch7, Ch8 in Rasmusen
8	Adverse Selection	Ch9 in Rasmusen
9	Signaling	Ch10, Ch11 in Rasmusen
10	Bargaining	Ch12 in Rasmusen
11	Auction	Ch13 in Rasmusen
12	Cooperation in two-person games	Ch8 in Myerson
13	Coalitions in cooperative games	Ch9 in Myerson
14	Social Responsibility	