Syllabus: Game Theory (06239137)
Fall 2023

Class time and place: Monday 18:40–21:30

Room 302, Science Teaching Building

Blackboard: Course materials, such as lecture slides, problem sets and solutions, will be available on Blackboard (http://course.pku.edu.cn).

Instructor: Ju Hu,

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Office hours: by appointment

Description: This course is an introduction of game theory to junior and higher year undergraduate students. The goal of this course is to provide a solid and systematic training of strategic thinking for undergraduate students. After this course, the students should be able to employ the basic ideas and tools in game theory to analyze easy strategic interactions in economics and other social sciences. The topics that this course covers include both static and dynamic games with or without complete information.

Prerequisites: Students must have taken Calculus and Intermediate Microeconomics. Some basic knowledge about elementary probability theory is helpful, but is not required.

Problem sets: Problem sets will be assigned every week. They are an integrated part of the course. You should spend a great deal of time and effort on them. You will not do well on the exams if you do not master them. You are encouraged to work in groups, but not by dividing up the questions. Write them up individually. The average of the *highest six* scores of your problem sets will be your overall performance on the problem sets.

Exams and grades: There will be a midterm exam on Nov 4, 2023 and a final exam on Jan 6, 2025. Your grade will be based 10% on your problem sets, 40% on

the midterm and 50% on the final.

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Textbook: The primary material will be my lecture notes, which mostly follow the textbook *Game Theory: An Introduction* by Steven Tadelis. There are also other excellent textbooks for undergraduate game theory: *Strategy: An Introduction to Game Theory* by Joel Waston; *Game Theory for Applied Economists* by Robert Gibbons. They can be good references for this course. *Game Theory: A Very Short Introduction* by Ken Binmore is a very good, non-technical exposition of game theory. You can read it for fun.

Tentative course outline:

- Static Games of Complete Information

    - Normal form game

    - Dominance

    - Iterated elimination of strictly dominated strategies

    - Nash equilibrium

    - Mixed strategies

- Dynamic Games of Complete Information

    - Extensive form game

    - Nash equilibrium for extensive form games

    - Backward induction

    - Subgame perfect equilibrium

    - Topics I: Repeated games

    - Topics II: Bargaining

- Static Games of Incomplete Information

    - Bayesian games

    - Bayesian Nash equilibrium

- Application: Auctions

- Dynamic Games of Incomplete Information (if time permits)

    - Sequential rationality

    - Perfect Bayesian equilibrium

    - Sequential equilibrium

    - Signaling

    - Cheap talk

About theorem numbering in the lecture notes: The numbering of theorems, lemmas, definitions and equations follows the form $X.Y$ where X refers to the set number of the lecture slides and Y refers to the number of the theorem/lemma/definition *within* this set of lecture slides. For example, Theorem 2.3 means the 3th theorem in Lecture Slides 2.