

COURSE CONTENT

Course Coordinator	Leong Kaiwen
Course Code	HE3602 / HE3032
Course Title	Game Theory
Pre-requisites	HE1004 Mathematics for Economists/ HE1003 Basic Mathematics for Economists (applicable to ECON) and HE2001 Microeconomics II / HE9092 Economic Theory / HE5092 Economic Theory
No of AUs	3
Contact Hours	39 hours (2 hours lecture and 1 hour tutorial per week)

Course Aims

Game theory is the study of strategic interactive decision making. It is widely used in political science, psychology and evolutionary biology, and it is the dominant paradigm of modern economic analysis. The first part of this course introduces the central concepts and the tools of game theoretical analysis, and the second part focuses on the use of game theory in economics with applications drawn upon settings such as auctions, oligopoly and price wars, organizational design and labour contracts. The course is aimed at 3rd and 4th year students interested in using mathematical modeling to study economic questions.

Intended Learning Outcomes (ILO)

By the end of this course, you (as a student) would be able to:

1. Describe what is a “game” in the language of game theory and define the key ingredients of a game.
2. Transform an economic relationship between two or more parties into a “game” and analyze (i.e., make predictions) the relationship from the lens of game theory.
3. Explain the differences in the information structure of a game and categorize each game into a game of perfect information, imperfect information, complete information, or incomplete information.
4. Apply the appropriate equilibrium concept for games with different information structures.
5. Critically evaluate the predictions made by each equilibrium concept and identify its short-comings.

Course Content

1. Definition of a “game” and strategies.
2. Dominance solvable.
3. Static games of complete information: Nash equilibrium.
4. Dynamic games of complete information: subgame perfect Nash equilibrium.
5. Static games of incomplete information: Bayes Nash equilibrium (BNE).
6. Application of BNE: auctions.

7. Dynamic games of incomplete information: perfect Bayesian Equilibrium (PBE).
8. Application of PBE 1: strategic communication and persuasion.
9. Application of PBE 2: signaling and education.
10. Repeated games.

Assessment (includes both continuous and summative assessment)

1.	Continuous Assessment	:	40%
2.	Final Examination	:	60%
	Total	:	100%

Reading and References

Gibbons, Robert. *A Primer in Game Theory*. MIT press, 1992.

This book covers many, but not all topics in the course. The book is optional.

Course Instructors

Instructor	Office Location	Email
Leong Kaiwen	SHHK 04-52	kleong@ntu.edu.sg

Planned Weekly Schedule

Week	Topic	Course LO	Readings/ Activities
1	Definition of games	1-5	Lecture notes
2	Dominance solvable	1-5	Lecture notes and homework exercises
3	Pure strategy Nash equilibrium	1-5	Lecture notes and homework exercises
4	Mixed strategy Nash equilibrium	1-5	Lecture notes and homework exercises
5	Subgame perfect Nash equilibrium	1-5	Lecture notes and homework exercises
6	Bayes Nash equilibrium	1-5	Lecture notes and homework exercises
7	Auctions	1-5	-
8	Midterm quiz	1-5	Lecture notes and homework exercises
9	Perfect Bayesian equilibrium (Part 1)	1-5	Lecture notes and homework exercises
10	Perfect Bayesian equilibrium (Part 2)	1-5	Lecture notes and homework exercises
11	Communication games	1-5	Lecture notes and homework exercises
12	Signaling models	1-5	Lecture notes and homework exercises
13	Repeated games	1-5	Lecture notes and homework exercises