

Syllabus of Fudan University

Department: Management Science

Date: Feb. 1, 2024

Course Code	MANA130343		
Course Title	Game Theory		
Credit	3	Credit Hours	48
Course Nature	<input type="checkbox"/> Specific General Education Courses <input type="checkbox"/> Core Courses <input type="checkbox"/> General Education Elective Courses <input type="checkbox"/> Basic Courses in General Discipline <input type="checkbox"/> Professional Compulsory Courses <input checked="" type="checkbox"/> Professional Elective Courses <input type="checkbox"/> Others		
Course Objectives	1) The students should learn how to describe games in the formal language of game theory. 2) Students should also learn how to recognize the major strategic considerations and predict the behavior in games using the concepts of game theory. 3) At the end of the course the students should be able to analyze and solve complicated games.		
Course Description	<p>This subject is an elective course in management science. Game theory is the mathematical study of multi-person strategic interactions, in which an individual's success depends on his/her own choice as well as the choices of others. Game theory has applications in many fields, such as politics, economics, biology, and computer science. The goal of this course is to give you a thorough introduction into game theory. The students should learn how to describe games in the formal language of game theory. Students should also learn how to recognize the major strategic considerations and predict the behavior in games using the concepts of game theory. At the end of the course the students should be able to analyze and solve complicated games. We will discuss four classes of games: static games of complete information, dynamic games of complete information, static games of incomplete information and dynamic games of incomplete information. Corresponding to these four classes of games will be four notions of equilibrium in games: Nash equilibrium, subgame-perfect Nash equilibrium, Bayesian Nash equilibrium and perfect Bayesian equilibrium. Furthermore, we'll use many examples related to platform economy to illustrate the basic ideas in this course.</p>		

Course Requirements:

Multivariate calculus, Concavity and convexity, Optimization theory, and Differential equations

Teaching Methods:

- 1) Lectures: basic theories and applications will be presented in the class through.
- 2) In-class discussions: sometimes discussion questions are raised by the lecturer. Students are encouraged to participate in discussions and share opinions with their peers. These discussions encourage students to think more for certain arguable topics.
- 3) Homework assignments: students accomplish tasks using techniques covered in class. Through the assignments, they can acquire hands-on experience using these techniques.

Instructor's Academic Background:***Education***

University of Miami, Coral Gables, FL, USA

Ph.D., Operations Management, 2013 – 2018.

Tsinghua University, Beijing, China

M.S., Applied Mathematics, 2011 – 2013.

B.S., Applied Mathematics, 2007–2011.

Research Interests

Supply chain contract, Interface issues with marketing and information economics, Sharing economy, Economics models in supply chain management

Members of Teaching Team

Name	Gender	Professional Title	Department	Responsibility
NO				

Course Schedule (Tentative):

Lecture	Subject	Supplement/Reference	Homework
1	Overview the course <ul style="list-style-type: none"> ▪ History of game theory; Basic ideas and examples ▪ Classifying game; Some terminology and background assumptions 	<ul style="list-style-type: none"> ▪ Fudenberg and Tirole, Introduction ▪ Dixit and Skeath, Section 2.2 	

2	Static games of complete information 1 <ul style="list-style-type: none"> Basic theory: normal-form Nash Equilibrium 	Gibbons, Section 1.1	Homework Set #1
3	Static games of complete information 2 <ul style="list-style-type: none"> Applications: Cournot and Bertrand model of Duopoly 	Gibbons, Section 1.2	Homework Set #2
4	Static games of complete information 3 <ul style="list-style-type: none"> Mixed Strategies 	Gibbons, Section 1.2 and 1.3	Homework Set #3
5	Dynamic games of complete information 1 <ul style="list-style-type: none"> Dynamic Games of Complete and Perfect Information Two-Stage games of complete but imperfect information 	Gibbons, Section 2.1 and 2.2	Homework Set #4
6	Dynamic games of complete information 2 <ul style="list-style-type: none"> Repeated Games 	Gibbons, Section 2.3	Homework Set #5
7	Dynamic games of complete information 3 <ul style="list-style-type: none"> Dynamic Games of Complete but imperfect information 	Gibbons, Section 2.4	Homework Set #6
8	Review class		
9	Midterm Exam		
10	Static games of incomplete information 1 <ul style="list-style-type: none"> Theory: Static Bayesian games and Bayesian Nash Equilibrium 	Gibbons, Section 3.1	Homework Set #7
11	Static games of incomplete information 2 <ul style="list-style-type: none"> Applications 	Gibbons, Section 3.2	Homework Set #8
12	Static games of incomplete information 3 <ul style="list-style-type: none"> The Revelation Principle 	Gibbons, Section 3.3	Homework Set #9
13	Dynamic games of incomplete information 1 <ul style="list-style-type: none"> Introduction to Perfect Bayesian Equilibrium 	Gibbons, Section 4.1	Homework Set #10
14	Dynamic games of incomplete information 2 <ul style="list-style-type: none"> Signaling Games 	Gibbons, Section 4.2	Homework Set #11
15	Dynamic games of incomplete information 3 <ul style="list-style-type: none"> Other applications of Perfect Bayesian Equilibrium 	Gibbons, Section 4.3	Homework Set #12
16	Review class		
17/18	Final Exam		

The design of class discussion or exercise, practice, experience and so on:

Supplier Encroachment:

- a) Arya, A., Mittendorf, B., & Sappington, D. E. (2007). The bright side of supplier encroachment. *Marketing Science*, 26(5), 651-659.
- b) Li, Z., Gilbert, S. M., & Lai, G. (2014). Supplier encroachment under asymmetric information. *Management science*, 60(2), 449-462.
- c) Li, Z., Gilbert, S. M., & Lai, G. (2015). Supplier encroachment as an enhancement or a hindrance to nonlinear pricing. *Production and Operations Management*, 24(1), 89-109.

If you need a TA, please indicate the assignment of assistant:

Grading the homework and preparing the solutions to the homework.

Grading & Evaluation:

In-class participation (20%)

Participation in class discussion, group discussion, and playing a proactive role in other in-class activities.

Homework assignment (20%)

Including individual assignments and term paper

Midterm exam (20%)

Two hours of open book exam

Final Exam (40%)

Two hours of open book exam

Teaching Materials & References:

References:

- 1) Robert Gibbons, *Game Theory for Applied Economists*, Princeton University Press, 1992
- 2) Drew Fudenberg and Jean Tirole, *Game Theory*, 6th edition, MIT press, 1991
- 3) Avinash Dixit and Susan Skeath, *Game of Strategy*, W.W.Norton & Company, 1999
- 4) Martin J. Osborne, *An Introduction to Game Theory*, Oxford University Press, 2003
- 5) <https://oyc.yale.edu/economics/econ-159>