
COURSE SYLLABUS
FOR FULL-TIME UNDERGRADUATE PROGRAMS

(Issued under Decision No.1380/QĐ-ĐHKTQĐ on 15/8/2016 by the University President)

1. COURSE NAME: GAME THEORY

Code: TOKT1117

Number of Credit: 2

2. DEPARTMENT IN CHARGE OF INSTRUCTION:

Office: *Location

Office Hours: *Times & Days

Office Telephone: *Phone Number

3. PRE-REQUISITE:

Theory of Probability, Microeconomics 1, Macroeconomics 1

4. COURSE DESCRIPTION:

This course introduces the basic elements of game theory, players, strategy, harvest, describing, modeling of economic problems by the language of game theory, as well as modeling the behavior of economic agencies. It emphasizes on the concept of Nash equilibrium and the application of Nash equilibrium in economics and business, including the pure and mixed equilibrium. It introduces three classes: static complete information, static incomplete information, and dynamic game.

5. COURSE OBJECTIVES:

This course equips students with basic knowledge of game theory, a field of decision making theory, and applications of game theory. Learners will have access to the method of modeling agency and behavior in economics and business, making decisions, and finding equilibrium strategies. Learners can also understand the application of game theory through specific situations such that they could apply in practice.

6. COURSE CONTENTS:

TENTATIVE SCHEDULE

<i>No.</i>	<i>Contents</i>	<i>Total hours</i>	<i>In details</i>		<i>Notes</i>
			<i>Theory</i>	<i>Practice, Discussion, Exams</i>	
1	Chapter 1	2	2	0	Computer and projector class room
2	Chapter 2	4	3	1	
3	Chapter 3	5	2	3	
4	Chapter 4	5	3	2	
5	Chapter 5	5	3	2	
6	Chapter 6	4	1	4	
7	Chapter 7	5	3	2	
	Total	30	17	13	

CHAPTER 1 – INTRODUCTION

This chapter presents an overview of the history of Game Theory. It outlines the development of the subject including solutions to problems in the past and recent applications in economics, politics and society. The first chapter also introduces the problem of game theory using mathematical tools, distinguishing it from other forms of the game; and outlines the concept and definition of the elements of game theory: player, strategy, outcome, rules of the game; distinguishing between types of games.

1.1. History of the game theory

1.2. Role in the economy

1.3. Examples of Games

1.4. Basic concept

Textbooks:

1- Nguyen Khac Minh, Introduction to Game Theory in Economics and Business, Science and Technics Publishing House, 2006, Chapter 1.

CHAPTER 2 – STATIC GAME OF COMPLETE INFORMATION

This chapter introduces the simplest, basic class of game theory, in which players simultaneously play provided that they know elements of the game is stated. It presents mathematical ways of thinking through concept of strictly dominated strategy. This chapter introduces the mathematician Nash and his famous concept "Nash equilibrium", and how to find the equilibrium in the static game of complete information. The concept of Nash equilibrium strategies are compared with the optimum, Pareto optimum to see the similarities and differences between these strategies.

2.1. Normal form Games

2.2. Iterated elimination of strictly dominated strategies

2.3. Nash equilibrium

Textbooks:

1- Nguyen Khac Minh, Introduction to Game Theory in Economics and Business, Science and Technics Publishing House, 2006, Chapter 2.

2- Robbarts Gibbons, 1992, Game Theory for Applied Economists, Princeton University Press, Chapter 1.

3- Drew Fudenberg, Jean Tirole, 2000, Game Theory, MIT Press, Chapter 1.

CHAPTER 3 – APPLICATIONS OF STATIC GAME OF COMPLETE INFORMATION

This chapter introduces the economic applications of static game of complete information and Nash equilibrium. Examples are classic problems in microeconomics, macroeconomics, starting from Cournot problems introduced in the early 19th century, Bertrand problems, the problem of arbitration between unions and employers on wages, and common ownership problems.

3.1. Cournot model of duopoly

3.2. Bertrand Model

3.3. Final-offer Arbitration

3.4. The problem of commons

Textbooks:

1- Nguyen Khac Minh, Introduction to Game Theory in Economics and Business, Science and Technics Publishing House, 2006, Chapter 3.

2- Robbarts Gibbons, 1992, Game Theory for Applied Economists, Princeton University Press, Chapter 1.

3- Drew Fudenberg, Jean Tirole, 2000, Game Theory, MIT Press, Chapter 1.

CHAPTER 4 – MIXED STRATEGY

Chapter 4 analyzes the static game of complete information using two specific examples of none or multiple pure equilibrium concepts arising the mixed strategy and mixed equilibrium strategy. The concepts of probability and expected value are included in the analysis to find the expected outcome instead of pure outcome.

4.1. Mixed strategy

4.2. Nash equilibrium

4.2.1. Coin problems

4.2.2. Examples (continued)

4.2.3. General problems

4.2.4. Examples of exist and not exist equilibrium

Textbooks:

1- Nguyen Khac Minh, Introduction to Game Theory in Economics and Business, Science and Technics Publishing House, 2006, Chapter 4.

- 2- Robbarts Gibbons, 1992, Game Theory for Applied Economists, Princeton University Press, Chapter 1.
- 3- Drew Fudenberg, Jean Tirole, 2000, Game Theory, MIT Press, Chapter 1.

CHAPTER 5 – STATIC GAME OF INCOMPLETE INFORMATION GAME STILL NOT FULL WITH INFORMATION

Chapter 5 introduces static game with incomplete information, when at least one player does not know the other players, or strategies, or outcomes of the other players. To describe the choices and decisions made by the player, the probability tools are used to analyze the expected outcome, leading to the equilibrium strategy. As the probability to determine the equilibrium is posterior probabilities which can be gained from priori information and it is calculated by Bayes' formula, the game is called Bayesian game.

- 5.1. Cournot competition under asymmetric information
- 5.2. Normal-form of static Bayesian game
- 5.3. Nash equilibrium in static Bayesian game

Textbooks:

- 1- Nguyen Khac Minh, Introduction to Game Theory in Economics and Business, Science and Technics Publishing House, 2006, Chapter 5.
- 2- Robbarts Gibbons, 1992, Game Theory for Applied Economists, Princeton University Press, Chapter 3.
- 3- Drew Fudenberg, Jean Tirole, 2000, Game Theory, MIT Press, Chapter 3.

CHAPTER 6 – APPLICATIONS OF STATIC GAME OF INCOMPLETE INFORMATION

Chapter 6 introduces some applications of static Bayesian game. Expanding the problems in the previous chapter, combining additional information, shows that Nash equilibrium under incomplete information approach complete information Nash equilibrium. The following application is the problem of the private auction, assuming the two players, only know the rules of the game, but information about competitors and evaluation is asymmetric information. Problem auction is extended to cases of double auction.

- 6.1. "Battle of the sexes"
- 6.2. Auction
- 6.3. Double auction

Textbooks:

- 1- Nguyen Khac Minh, Introduction to Game Theory in Economics and Business, Science and Technics Publishing House, 2006, Chapter 6.
- 2- Robbarts Gibbons, 1992, Game Theory for Applied Economists, Princeton University Press, Chapter 3.
- 3- Drew Fudenberg, Jean Tirole, 2000, Game Theory, MIT Press, Chapter 3.

CHAPTER 7 – DYNAMIC GAME

Chapter 7 introduces dynamic games with complete and perfect information. The problem is described as an action tree, with the actions of the player described by the edges. The concept of strategy in a dynamic game is also extended to the set of continuous actions. Basic algorithms for dynamic game with complete and perfect information is backwards induction, solving from the last node to the start one to find the balance in each stage. The problem can also be expanded, thus developing into an infinite loop problem.

7.1. Extensive form of the game

7.2. Advertising game

7.3. Backwards induction

7.4. Stackelberg model

Textbooks:

1- Robbarts Gibbons, 1992, Game Theory for Applied Economists, Princeton University Press, Chapter 2.

2 - Drew Fudenberg, Jean Tirole, 2000, Game Theory, MIT Press, Chapter 2.

7. REQUIRED TEXTBOOKS & COURSE MATERIALS

Nguyen Khac Minh, Introduction to Game Theory in Economics and Business, Science and Technics Publishing House, 2006.

8. RECOMMENDED TEXTS & OTHER READINGS

Robbarts Gibbons, Game Theory for Applied Economists, Princeton University Press, 1992.

Drew Fudenberg, Jean Tirole, Game Theory, MIT Press, 2000.

9. ASSESSMENT & GRADING POLICY:

- Band score: 10 and 4

- In detail:

+ Attendance: 10%

+ Midterm test: 30%

+ Final test: 60%

Hanoi, 2016

HEAD OF DEPARTMENT

PRESIDENT

(signed)

(signed)

PhD. Nguyen Manh The

Prof.Dr. Tran Tho Dat