UAB
Universitat Autònoma de Barcelona

2017/2018

Game Theory

Code: 102477
ECTS Credits: 6

Degree	Type	Year	Semester
2501572 Business Administration and Management	OT	4	0
2501573 Economics	OB	3	2

Contact

Name: Jordi Massó Carreras

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Use of languages

Principal working language: spanish (spa)

Some groups entirely in English: Yes

Some groups entirely in Catalan: No

Some groups entirely in Spanish: Yes

Teachers

Jordi Massó Carreras

Antonio Miralles Asensio

Marina Bannikova

Prerequisites

Introduction to Economics

Mathematics I and II

Microeconomics I and II

Objectives and Contextualisation

To learn the basic elements of game theory and to develop an understanding of its applications to economic analysis.

Non-cooperative games: games of perfect and imperfect information, zero sum games.

Solution concepts: Dominance, Nash equilibrium and subgame perfect Nash equilibrium.

Applications: Bargaining, Voting and Cost-sharing

Cooperative games: Games in characteristic form, stable allocations, and the value of a game.

Skills

Economics
- Capacity for adapting to changing environments.
- Demonstrate initiative and work individually when the situation requires it.

- Demonstrate understanding of the basic element of game theory and develop the habit of understanding its application in the solution of problems of economic analysis.
- Lead multidisciplinary and multicultural teams, implementing new projects and coordinating, negotiating and managing conflicts.
- Organise the work in terms of good time management, organisation and planning.
- Select and generate the information necessary for each problem, analyse it and take decisions based on that information.
- Take decisions in situations of uncertainty, demonstrating an entrepreneurial and innovative attitude.
- Understand the restrictions involved in negotiations process and how to arbitrate them.
- Use of the available information technology and adaptation to new technological environments.
- Value ethical commitment in professional practice.

Learning outcomes

1. A capacity of oral and written communication in Catalan, Spanish and English, which allows them to summarise and present the work conducted both orally and in writing.
2. Analyse the distribution of costs in view of the implementation of a new shared service.
3. Analyse the strategic interactions between participants and the effects of their actions on third-party decisions.
4. Apply the game theory to economic and business decisions.
5. Apply the game theory to the case of agents in a negotiation, in auctions and in macroeconomic matters.
6. Assess ethical commitment in professional activity.
7. Assess the consequences of changing a particular representation system for another.
8. Assess the different proposals of implementing public goods in terms of social welfare.
9. Capacity to adapt to changing environments.
10. Demonstrate initiative and work independently when required.
11. Lead multidisciplinary and multicultural teams, implement new projects, coordinate, negotiate and manage conflicts.
12. Make decisions in situations of uncertainty and show an enterprising and innovative spirit.
13. Organise work, in terms of good time management and organisation and planning.
14. Select and generate the information needed for each problem, analyse it and make decisions based on this information.
15. Understand the different voting systems and the consequences of each of these.
16. Use available information technology and be able to adapt to new technological settings.

Content

Module 1. Introduction to Game Theory and Examples

- The aim of Game Theory
- Decision Theory with one agent
- Decision Theory with at least two agents: Game Theory
- History of Game Theory
- Non-Cooperative Games versus Cooperative Games
- Examples

Module 2. Games in Normal Form

- Definition and examples
- Nash equilibrium
- Interpretations and problems of Nash equilibrium
- The mixed extension of a game
- Existence of Nash equilibrium: The Nash Theorem
- Computing Nash Equilibria
- Two-person zero-sum games: The Minimax Theorem

Module 3. Games in Extensive Form

- Preliminaries
- Perfect information
- Backwards induction,Nash equilibrium and Kuhn's Theorem
- Imperfect information

Module 4. Nash equilibrium and related issues

- Introduction
- Dominant strategies
- Elimination of dominated strategies
- Subgame perfect equilibrium

Module 5. Cooperative Games

- Preliminaries
- The Core
- The Shapley value

Module 6. Applications

- Axiomatic and strategic bargaining
- Voting
- Dominant strategy implementation
- Cost-sharing

Methodology

This course combines lectures with more applied sessions devoted to the resolution of problem sets and exercises.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Exercises and group discussions	15	0.6	2, 3, 4, 5, 15, 7, 8
Lectures	30	1.2	2, 3, 4, 5, 15, 7, 8
Type: Supervised			
Tutorials	15	0.6	2, 3, 4, 5, 9, 1, 15, 10, 11, 13, 12, 14, 16, 6, 7, 8
Type: Autonomous			
Readings	15	0.6	9, 1, 10, 11, 13, 12, 14, 16, 6
Study. Preparation of exercises and discussions	67	2.68	2, 3, 4, 5, 9, 1, 15, 10, 11, 13, 12, 14, 16, 6, 7, 8

Evaluation

There will be a continuous assessment of student progress by way of two partial exams and a final exam. Final grades will be computed according to the following weights: 60% Final exam, 20% each partial exam.

The minimum passing grade is 5. If a student obtains a grade lower than 4 he or she will have to retake the
c o u r s e .
Those students that obtain a grade between 4 and 5 are eligible for re-evaluation. The details of the
re-evaluation will be published along with the final grades, and it will take place at the time and date
established in the faculty's calendar. If a student obtains a passing grade in the re-evaluation he or she will
obtain 5 as a final grade, and otherwise will retain his or her original grade. No examinations will be offered at
different dates from the ones established for each group.

A student will only be eligible to the "not evaluable" status if he or she has not taken part in any of the
assesments.

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Final exam	60%	3	0.12	2, 3, 4, 5, 9, 1, 15, 10, 11, 13, 12, 14, 16, 6, 7, 8
Partial exams	40%	5	0.2	2, 3, 4, 5, 9, 1, 15, 10, 11, 13, 12, 14, 16, 6, 7, 8

Bibliography

Basic references

- Roy Gardner. Games for Business and Economics. John Wiley & Sons, Inc. (1995).
- Robert Gibbons. A Primer in Game Theory. Princeton University Press (1992).
- Martin J. Osborne. An Introduction to Game Theory. Oxford University Press (2004).

Advanced references

- Michael Maschler, Eilon Solan, and Shmuel Zamir. Game Theory. Cambridge University Press (2013).
- Roger B. Myerson. Game Theory: Analysis of Conflict. Harvard University Press (1991).
- Martin J. Osborne and Ariel Rubistein. A Course in Game Theory. The MIT Press (1994).
- Fernando Vega Redondo. Economics and the Theory of Games. Cambridge University Press (2003).