

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

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Use of languages

Principal working language: spanish (spa)
Some groups entirely in English: Yes
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: Yes

Teachers

Jordi Massó Carreras
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, the core 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

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	17	0.68	2, 3, 4, 5, 15, 7, 8
Lectures	33	1.32	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

Evaluation

There will be a continuous assessment of student progress by way of two partial exams, a final exam and three delivery and correction of exercises. Final grades will be computed according to the weights of 48% the final exam, 20% each partial exam and 4% each delivery and correction of exercises.

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

Calendar of evaluation activities

The dates of the evaluation activities (midterm exams, exercises in the classroom, assignments, ...) will be announced well in advance during the semester.

The date of the final exam is scheduled in the assessment calendar of the Faculty.

"The dates of evaluation activities cannot be modified, unless there is an exceptional and duly justified reason why an evaluation activity cannot be carried out. In this case, the degree coordinator will contact both the teaching staff and the affected student, and a new date will be scheduled within the same academic period to make up for the missed evaluation activity." **Section 1 of Article 115. Calendar of evaluation activities (Academic Regulations UAB).** Students of the Faculty of Economics and Business, who in accordance with the previous paragraph need to change an evaluation activity date must process the request by filling out an **Application for exams' reschedule**

https://eformularis.uab.cat/group/deganat_feie/application-for-exams-reschedule

Grade revision process

After all grading activities have ended, students will be informed of the date and way in which the course grades will be published. Students will be also be informed of the procedure, place, date and time of grade revision following University regulations.

Retake Process

"To be eligible to participate in the retake process, it is required for students to have been previously been evaluated for at least two thirds of the total evaluation activities of the subject." **Section 3 of Article 112 ter. The recovery (UAB Academic Regulations).** Additionally, it is required that the student to have achieved **an average grade of the subject between 3.5 and 4.9.**

The date of the retake exam will be posted in the calendar of evaluation activities of the Faculty. Students who take this exam and pass, will get a grade of 5 for the subject. If the student does not pass the retake, the grade will remain unchanged, and hence, student will fail the course.

Irregularities in evaluation activities

In spite of other disciplinary measures deemed appropriate, and in accordance with current academic regulations, *"in the case that the student makes any irregularity that could lead to a significant variation in the grade of an evaluation activity, it will be graded with a 0, regardless of the disciplinary process that can be instructed. In case of various irregularities occur in the evaluation of the same subject, the final grade of this subject will be 0".* **Section 10 of Article 116. Results of the evaluation. (UAB Academic Regulations).**

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Delivery and correction of exercises	12%	0	0	2, 3, 4, 5, 9, 1, 15, 10, 11, 13, 12, 14, 16, 6, 7, 8
Final exam	48%	3	0.12	2, 3, 4, 5, 9, 1, 15, 10, 11, 13, 12, 14, 16, 6, 7, 8
Partial exams	40%	0	0	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 Rubinstein. *A Course in Game Theory*. The MIT Press (1994).
- Fernando Vega Redondo. *Economics and the Theory of Games*. Cambridge University Press (2003).