UAB
Universitat Autònoma de Barcelona

Game Theory

Code: 102477
ECTS Credits: 6

2024/2025

Degree	Type	Year
2501572 Business Administration and Management	OT	4
2501573 Economics	OB	3
2504216 Contemporary History, Politics and Economics	OT	3
2504216 Contemporary History, Politics and Economics	OT	4

Contact

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Teachers

Jordi Masso Carreras
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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

There are no prerequisites

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 in normal form and games in extensive form with perfect and imperfect information.

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.

Competences

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.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills in order to undertake further training with a high degree of autonomy.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
- 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.

Contemporary History, Politics and Economics

- Assess the social, economic and environmental impact when acting in this field of knowledge.
- Distinguish between and analyse the type of relations that have been established over the last century among the different social, political and economic agents on national, regional and international frameworks.
- Identify the main actors, structure and functioning of political systems in the internal and international sphere from a theoretical or applied perspective.
- Innovate in the methods and processes of this area of knowledge in response to the needs and wishes of society.
- Manage and apply data to solve problems.
- Recognise the basic foundations of economic analysis from both a microeconomic and macroeconomic perspective.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
- Work cooperatively in multidisciplinary and multicultural teams implementing new projects.

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. Communicating in oral and written form in Catalan, Spanish and English, in order to be able to summarise and present the carried out project in both forms.
11. Demonstrate capacity to adapt to changing environments.
12. Demonstrate initiative and work independently when required.
13. Demonstrate motivation regarding the quality of the work performed and sensitivity regarding the consequences on the environment and society.
14. Identify the consequences of the existence of information asymmetry among different economic agents on the way in which these organise themselves and on the efficiency of the relationship they establish.
15. Lead multidisciplinary and multicultural teams, implement new projects, coordinate, negotiate and manage conflicts.
16. Make decisions in situations of uncertainty and show an enterprising and innovative spirit.
17. Organise work in relation to good time management and planning.
18. Organise work, in terms of good time management and organisation and planning.
19. Select and generate the information necessary for each problem, analyse it and take decisions based on that information.
20. Select and generate the information needed for each problem, analyse it and make decisions based on this information.
21. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
22. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
23. Students must develop the necessary learning skills in order to undertake further training with a high degree of autonomy.
24. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
25. Understand the different voting systems and the consequences of each of these.
26. Use available information technology and be able to adapt to new technological settings.
27. Use basic optimisation tools and the game theory, and include these elements in a theoretical model.
28. Value ethical commitment in professional practice.
29. Work cooperatively in multidisciplinary and multicultural teams implementing new projects.

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

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Exercises and group discussions	17	0.68	2, 3, 4, 5, 25, 7, 8
Lectures	32.5	1.3	2, 3, 4, 5, 25, 7, 8
Type: Supervised			
Tutorials	15	0.6	2, 3, 4, 5, 9, 1, 25, 12, 15, 18, 16, 20, 26, 6, 7, 8
Type: Autonomous			
Readings	9	0.36	9, 1, 12, 15, 18, 16, 20, 26, 6
Study. Preparation of exercises and discussions	70.5	2.82	2, 3, 4, 5, 9, 1, 25, 12, 15, 18, 16, 20, 26, 6, 7, 8

Teaching will be offered on campus.

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

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Final exam	48%	2	0.08	2, 3, 4, 5, 9, 1, 11, 12, 25, 14, 15, 13, 17, 18, 16, 24, 23, 22, 21, 20, 19, 10, 29, 27, 26, 6, 28, 7, 8
Partial exams	32%	2	0.08	2, 3, 4, 5, 9, 1, 11, 12, 25, 15, 13, 17, 18, 16, 24, 20, 19, 10, 29, 27, 26, 6, 7, 8
Short tests	20%	2	0.08	2, 3, 4, 5, 9, 1, 11, 12, 25, 15, 13, 17, 18, 16, 24, 20, 19, 10, 29, 27, 26, 6, 7, 8

Continuous Evaluation

There will be a continuous assessment of student progress by way of one partial exam, a final exam and two short tests. Final grades will be computed according to the weights of 48% the final exam, 32% the partial exam and 10% each short test.

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

Calendar of continuous 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

Comprehensive evaluation

By requesting the comprehensive evaluation the student waives the option of continuous evaluation.
The comprehensive evaluation must be requested at the Academic Management (Gestió acadèmica) of the Campus where the degree/master's degree is taught. The request must be filed according to the procedure and the deadline established by the administrative calendar of the Faculty of Economics and Business.
Attendance :
Student attendance is mandatory on the day of the comprehensive assessment. The date will be the same as that of the final exam of the semester as per the evaluation calendar published by the Faculty of Economics and Business and approved by the Faculty's Teaching and Academic Affairs Committee. The duration of the comprehensive assessment must be specified in the characteristics of such activity.
100% of the evaluation evidences must be handed in by the student on the day of the comprhensive assessment.
The evaluation evidences carried out in person by the student on the same day of the comprehensive assessment must have a minimum weight of 70%.

Evidence Type: Exam

Weight in the final assessment: 100%

Duration of the activity: 2 hours

Is the activity that corresponds to this evaluation evidence to be carried out in person on the date scheduled for the comprehensive evaluation? YES

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

All students are required to perform the evaluation activities. If the student's grade is 5 or higher, the student passes the course and it cannot be subject to further evaluation. If the student grade is less than 3.5, the student will have to repeat the course thefollowing year. Students who have obtained a grade that is equal to or greater than 3.5 and less than 5 can take a second chance exam. The lecturers will decide the type of the second chance exam. When the second exam grade is greater than 5, the final grade will be a PASS with a maximum numerical grade of 5. When the second exam grade is less than 5, the final grade will be a FAIL with a numerical grade equal to the grade achieved in the course grade (not the second chance exam grade).

A student who does not perform any evaluative task is considered "not evaluable", therefore, a student who performs a continuous assessment component can no longer be qualified with a "not evaluable".

The date of the retake exam will be posted in the calendar of evaluation activities of the Faculty.

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).***

The proposed evaluation activities may undergo some changes according to the restrictions imposed by the health authorities on on-campus courses.

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).

Software

No specific software is used

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Catalan/Spanish	second semester	morning-mixed
(PAUL) Classroom practices	8	English	second semester	morning-mixed
(PAUL) Classroom practices	14	Catalan	second semester	morning-mixed
(PAUL) Classroom practices	51	Catalan	second semester	afternoon
(TE) Theory	1	Catalan/Spanish	second semester	morning-mixed
(TE) Theory	8	English	second semester	morning-mixed
(TE) Theory	14	Catalan	second semester	morning-mixed
(TE) Theory	51	Catalan	second semester	afternoon