UAB
Universitat Autònoma de Barcelona

Game Theory

Code: 104375
ECTS Credits: 6

2024/2025

Degree	Type	Year
2503758 Data Engineering	OT	4

Contact

Name: Jordi Masso Carreras

Email: jordi.masso@uab.cat

Teachers

Marina Bannikova

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

- Demonstrate sensitivity towards ethical, social and environmental topics.
- Generate innovative and competitive proposals in professional activity and research.

- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.

Learning Outcomes

1. Demonstrate sensitivity towards ethical, social and environmental topics.
2. Generate innovative and competitive proposals in professional activity and research.
3. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
4. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.

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	10.5	0.42	1, 2, 3, 4
Lectures	33	1.32	1, 2, 3, 4
Type: Supervised			
Tutorials	15	0.6	1, 2, 3, 4
Type: Autonomous			
Readings	15	0.6	1, 2, 3, 4
Study. Preparation of exercises and discussions	70.5	2.82	1, 2, 3, 4

Teaching will be offered on campus.

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

The proposed teaching methodology may undergo some modifications according to the restrictions imposed by the health authorities on on-campus courses

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	1, 2, 3, 4
Partial exams	32%	2	0.08	1, 2, 3, 4
Short tests	20%	2	0.08	1, 2, 3, 4

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 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

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 the following 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/Spanish	second semester	morning-mixed
(PAUL) Classroom practices	51	Catalan/Spanish	second semester	afternoon
(TE) Theory	1	Catalan/Spanish	second semester	morning-mixed
(TE) Theory	8	English	second semester	morning-mixed
(TE) Theory	14	Catalan/Spanish	second semester	morning-mixed
(TE) Theory	51	Catalan/Spanish	second semester	afternoon