



## 25071 - GAME THEORY (2018-19)

### General

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**Code:** 25071

**Lecturer responsible:**

CUEVA HERRERO, CARLOS

<b>Credits ECTS:</b>	<b>6</b>
Theoretical credits:	1,44
Practical credits:	0,96
Distance-base hours:	3,6

### Departments involved

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- **Dept:** FOUNDATIONS OF ECONOMIC ANALYSIS  
**Area:** FOUNDATIONS OF ECONOMIC ANALYSIS  
**Theoretical credits:** 1,44  
**Practical credits:** 0,96  
This Dept. is responsible for the course.  
This Dept. is responsible for the final mark record.

### Study programmes where this course is taught

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- DEGREE IN MATHEMATICS  
Course type: OPTIONAL (Year: 4)

## Competencies and objectives

### Course context for academic year 2018-19

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Game Theory is one of the four optional subjects in the itinerary of Mathematics applied to Social Sciences. The other three subjects are Time Series, Social Choice Theory and Economics of Information and Uncertainty.

The subject is concerned with situation of strategic interdependence. This means that each agent recognizes that her final payoffs or earnings depend not only on her own actions, but also on the actions of the other agents.

Game Theory is one of the most powerful tools in modern economic analysis and its applications extend to many situations that we will explore during this course.

### Course content (verified by ANECA in official undergraduate and Master's degrees)

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#### Specific Competences (CE)

- **CE10** : Communicate, both orally and in writing, mathematical knowledge, procedures, results and ideas.
- **CE11** : Ability to solve academic, technical, financial and social problems using mathematical methods.
- **CE12** : Ability to work in a team, providing mathematical models adapted to the needs of the group.
- **CE15** : Recognise and analyse new problems and prepare strategies to resolve them.
- **CE5** : Propose, analyse, validate and interpret models of simple real-life situations, using the most appropriate mathematical tools for the purpose.
- **CE7** : Use computer applications for statistical analysis, numerical calculus and symbolic calculus, graphic visualisation and others to experiment in Mathematics and solve problems.
- **CE9** : Use bibliographic search tools for Mathematics.

#### Exclusive skill taught in this course

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No data

## Learning outcomes (Training objectives)

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No data

## Specific objectives stated by the academic staff for academic year 2018-19

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- To understand the most important models, concepts and results of game theory
- To be able to model and analyse multiperson decision problems as games
- To be familiar with the connections between game theory and the social sciences
- To apply game theoretic analysis to problems of competitive and cooperative interaction presented in the social sciences

## Content and bibliography

### Content for academic year 2018-19

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#### **Theme 1. Introduction**

What is game theory? The prisoners' dilemma. Cooperation. Are we selfish? Beauty contests.

#### **Theme 2. Static games with complete information**

Introduction. Normal form. Rationality. Dominated strategies. Common knowledge of rationality. Best responses. Nash equilibrium. Applications. Mixed strategies. Applications.

#### **Theme 3. Introduction to evolutionary game theory**

Scope and motivation. Evolutionarily Stable Strategy (ESS). Biological definition. Economic definition. Polymorphic equilibria.

#### **Theme 4. Dynamic games with complete information**

Introduction. Extensive form. Backward induction. Strategies. Nash Equilibrium. Subgame perfect Nash Equilibrium (SPNE). Applications. Repeated games. Applications.

#### **Theme 5. Static games with incomplete information or Bayesian games**

Introduction. Normal form. Bayes-Nash Equilibrium (BNE). Applications.

#### **Theme 6 Dynamic games with incomplete information**

Introduction. Extensive form. Introduction to Perfect Bayesian Equilibrium. Applications.

## Assessment

### Assessment procedures and criteria 2018-19

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- Problem sets (4 in total, 30%)
- Class participation (20%)
- Class presentation or final exam (50%)

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Description	Criteria	Type	Weighting system
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Problem sets	4 in total	ACTIVITIES OF EVALUATION DURING THE SEMESTER	30
Participation in class	Attending and actively participating in class	ACTIVITIES OF EVALUATION DURING THE SEMESTER	20
Final exam or presentation	Students may choose either option	FINAL TEST	50

## Official exam dates for academic year 2018-19

Exam session	Date	Time	Group - Classroom(s) allocated	Comments
(C2) Periodo ordinario para asignaturas de primer semestre	16/01/2019	09:00 - 12:00	CI/0005 	
(C4) Pruebas extraordinarias para asignaturas de grado y máster	01/07/2019			

