



PRESENTACIÓN

- **Brief description of subject:** This subject presents the basic concepts of strategic analysis that game theory develops for students to be able to analyze situations of cooperation and conflict in economic environments.
- **Carácter:** Mandatory
- **ECTS:** 6
- **Curso y semestre:** 2nd year, 1st term
- **Idioma:** English
- **Título:** Game Theory
- **Módulo y materia de la asignatura:** I. General Economics, I.1 Microeconomics
- **Professor in charge of the subject:** Markus Kinateder (mkinateder@unav.es)
- Lecture rooms and detailed schedule: please see "Lectures"
- **WARNING TO EXCHANGE STUDENTS (NOT FROM UNAV'S ECONOMICS DEGREE):**
This subject requires advanced knowledge of calculus, algebra and statistics and is more comparable to a 4th year subject at other universities

COMPETENCIAS

CG1 To be familiar with different areas of the theory and/or application of economic analysis.

CG7 To reach conclusions of a regulatory nature that are relevant to economic policy based on positive knowledge.

SC1 To be familiar with the fundamental concepts and methods of economic theory.

SC3 To use the concepts, theories and models of economic theory to assess the reality of the economic context.

SC10 To apply the tools of economic theory to the analysis and discussion of real situations.

PROGRAMA

Programme

1. Simultaneous move games and Nash equilibrium (Ch. 2&4)

1.1 Definition and basics

Rationality

Elements of a game (rules, strategies, payoff function)

1.2 Types of strategies

Dominant strategies

1.3 Payoff Matrix



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1.4 Nash equilibrium in pure strategies

1.5 Some Games

- Prisoner's Dilemma
- Chicken Game
- Hawk and Dove game
- Battle of sexes
- Others

1.6 Focal Points

2. Mixed and correlated strategies (Ch. 7)

2.1 Nash equilibrium in mixed strategies

2.2 Coordination devices

- Definition
- Correlated equilibrium

3. Sequential Games (Ch. 3)

3.1 Definition and basics

- Sequential rationality
- Elements of a sequential game (rules, strategies, payoff function)

3.2 Decision Trees

3.3 Subgame perfect equilibrium

- Backwards Induction
- Credible threats
- Comparison with Nash equilibrium (incredible threats)

3.4 Some Games

- Ultimatum Game
- Centipede Game
- Entry Game

4. Games with incomplete information (Ch. 9)



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4.1 Definition and basics

- Rationality with incomplete information (beliefs)
- Elements of a game with incomplete information (rules, strategies, payoff function)

4.2 Simultaneous games of incomplete information

- Bayesian Nash equilibrium

4.3 Sequential games of incomplete information

- Forward induction
- Sequential equilibrium

5. Other equilibrium concepts

- 5.1 Stability of equilibrium
- 5.2 Trembling hand perfect equilibrium
- 5.3 Communication equilibrium

6. Repeated Games (Ch. 10)

- 6.1 Definition and basics
- 6.2 Finitely repeated games
- 6.3 Infinitely repeated games
- 6.4 Coordination in repeated games: Folk Theorem

7. Cooperative game theory

- 7.1 Definition and basics
 - Rationality
 - Elements of a game (rules, strategies, characteristic function)
- 7.2 Types of cooperative games
 - Transferable utility (TU) games
 - Non-transferable utility (NTU) games
- 7.3 Coalition formation
- 7.4 Core and Shapley value



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8. Miscellaneous

8.1 Some applications of Game theory

- Oligopoly analysis
- Auctions (Ch. 15)
- Bargaining (Ch. 17)
- Simulations

8.2 Network economics

8.3 Evolutionary Game theory (Ch. 12)

8.4 Mechanism Design (Ch. 14)

In Spanish (for legal reference only - no worries the lecture and all the subject is entirely taught in English):

Tema 1: Juegos simultáneos y el equilibrio de Nash (NE)

1.1 Definiciones y supuestos básicos

- Racionalidad
- Elementos del juego (reglas, estrategias, función de pagos)

1.2 Tipos de estrategias

- Estrategias dominantes

1.3 Matrix de pagos

1.4 Equilibrio de Nash en estrategias puras

1.5 Juegos "tipo"

- Dilema del prisionero
- Juego del gallina
- Juego del halcón y la paloma
- Batalla de los sexos
- Otros (juegos sin equilibrio)

1.6 Puntos focales

Tema 2: Estrategias mixtas y correlacionadas

2.1 Equilibrio de Nash en estrategias mixtas



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2.2 Mecanismo aleatorio como coordinación

- Definiciones: mecanismo aleatorio
- Equilibrio correlacionado o correlado

Tema 3: Juegos secuenciales

3.1 Definiciones y supuestos básicos

- Racionalidad
- Elementos del juego (reglas, estrategias, función de pagos)

3.2 Árboles de decisión

3.3 Equilibrio perfecto en subjuego

- Inducción "hacia atrás"
- Amenazas creíbles
- Comparación con el Equilibrio de Nash

3.4 Juegos "tipo"

- Juego del ultimátum
- Juego del ciempiés
- Juego de entrada a mercado

Tema 4: Juegos con información incompleta

4.1 Definiciones y supuestos básicos

- Racionalidad con información incompleta
- Elementos del juego (reglas, estrategias, función de pagos)

4.2 Juegos con información incompleta simultáneos

- Equilibrio de Nash Bayesiano

4.3 Juegos con información incompleta secuenciales

- Creencias consistentes y racionalidad secuencial
- Inducción hacia delante
- Equilibrio secuencial

Tema 5: Otros conceptos de equilibrio



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5.1 Equilibrios estables

5.2 Equilibrio perfecto de manos temblorosas

5.3 Equilibrios con comunicación

Tema 6: Juegos repetidos

6.1 Definiciones y supuestos básicos

6.2 Juegos repetidos finitos

6.3 Juegos repetidos infinitos

6.4 Coordinación repetida en juegos repetidos

- El teorema de la tradición oral

Tema 7: Teoría de juegos cooperativa

7.1 Definiciones y supuestos básicos

- Racionalidad

- Elementos del juego (reglas, estrategias, función característica)

7.2 Tipos de juegos cooperativos

- Juegos con transferencia de utilidad

- Juegos sin transferencia de utilidad

7.3 Formación de coaliciones

7.4 "Core" y valor de "Shapley"

Tema 8: Tópicos misceláneos

8.1 Aplicaciones usuales de la teoría de juegos

- Análisis de oligopolios

- Subastas

- Negociación

- Resolución de juegos en simuladores

8.2 Economía de redes

8.3 Juegos evolutivos



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8.4 Diseño de mecanismos

LECTURES

Each week there are four hours of lectures scheduled (lecture attendance is mandatory). (There is no video transmission of lectures, etc., all activities are on-site.)

Lectures include theoretical and exercise sessions, some of which will be prepared by the student beforehand.

Place and time: Monday 8-10am, Lecture Room 9, FCOM (Communication Faculty Building), Thursday 5:30-7:30 pm, Lecture Room B2 (Amigos Bldg.)

EVALUACIÓN

WARNING TO EXCHANGE STUDENTS (NOT FROM UNAV'S ECONOMICS DEGREE): This subject requires advanced knowledge of calculus, algebra and statistics and is more comparable to a 4th year subject at other universities.

All exams take place on-site. There is no possibility to do exams online.

Ordinary exam (Dec) weights of final grade:

20% Continuous evaluation: Miniexam (each counts 10%)

30% Midterm Exam

50% Final Exam

A student who does not hand in an exam when requested on the official examination date receives a NP (Not Present) that is equivalent to a 0 grade.

Extraordinary exam (June) weights of final grade:

20% Continuous evaluation: Miniexam (each counts 10%)

30% Midterm Exam

50% Final Retake Exam

A student who does not hand in an exam when requested on the official examination date receives a NP (Not Present) that is equivalent to a 0 grade.

Dates: all lecture rooms are in Amigos Building

Miniexam: Monday, Oct 9th, 18:30, Aula 16, Exam Duration: 30 min

Midterm: Thursday, Nov 2nd, 8:15, Aula B1, Exam Duration: 45 min



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Monday, Nov 20th, 8:15 and place: Aula 11 Amigos Bldg., Exam Duration: 30 min

Final: Friday December 15th, 15:30 Aula 16, Exam Duration: 60 min

Retake (June): **THURSDAY June 13th**, Exam Duration: 60 min

(Office Hours: June 10th and 12th or by appointment before, Exam Revision: June 14th, 17th and 18th)

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OFFICE HOURS

Office Hours have to be booked in advance. A Google drive file (a couple of days before office hours take place) will be available to do so. Please respect this procedure.

Office: 2550, Amigos Bldg., Tower

The next scheduled office hours will be on June 10th and 12th. If you wish to be attended before, please contact my be email.

Revision of the retake exam will be personal (in my office) and will take place on June 14th, 17th and 18th - a detailed schedule will be announced in June. There is no revision online or by email. I will usually not reply to emails regarding the exam revision.

In case all slots are booked, please be patient and come back half a day later, all office hour requests will be attended!!

BIBLIOGRAFÍA

Games of Strategy, by Avinash Dixit, Susan Skeath, David McAdams, Norton [Find it in the Library](#)

Please see the programme for references to which chapters to read.

(The book I use is the fifth and newest edition, though earlier editions will serve equally well, yet the references to the chapters may vary)

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