Universitat Pompeu Fabra Barcelona

Academic Year/course: 2020/21

23170 - Game Theory and the Design of Institutions

Syllabus Information

Academic Course: 2020/21
Academic Center: 304 - Faculty of Law and Economics
332 - Faculty of Economic and Business Sciences

Study: 3327 - Bachelor's degree in International Business Economics

Subject: 23170 - Game Theory and the Design of Institutions
Credits: 5.0
Course: 3 and 4
Teaching languages:

Theory:	Group 1: English
Seminar:	Group 101: English
	Group 102: English

Teachers: Antonio Penta
Teaching Period: Second Quarter

Presentation

The goal of this course is to introduce you to the main concepts of game theory, and more generally to teach you how to ?think strategically?, applying game theoretic tools to understand real-world strategic situations. In a strategic situation, individuals? payoffs depend on their own choices as well as on others?. But if the best course of action depends on others? behavior, acting rationally in a game
entails forming expectations about others. Thinking strategically means that, in forming these expectations, individuals should also take into account that other players are rational, and will be making their choices based on their expectations about everyone else, and so on. Game theory provides a mathematical methodology to analyze this kind of problems formally. Game theory nowadays represents the core apparatus of modern economic theory, but it has important applications in disciplines such as biology, computer science, engineering, political science, sociology, finance, etc. During the course we will discuss several such applications, mainly withing economics, but also from other social sciences.

Associated skills

Instrumental:

- Ability to analyze and synthesize
- Ability to organize and plan
- General basic mathematical knowledge
- Problem solving
- Written and spoken capabilities

Interpersonal:

- Criticism
- Learning capacities
- Research abilities
- Autonomous work
- Ability to generate new ideas (creativity)

Systemic: Other:

? Written and oral communication abilities using a specialized language (mathematics)

SPECIFIC SKILLS

- Model formalization of different settings through mathematical language
- Solutions of mathematical models
- Ability to connect the theory with applications to economics and other related fields

Learning outcomes

- Knowledge of the fundamental concepts of game theory
- Knowledge of the main results in economic theory obtained applying game theoretic concepts (e.g., analysis of auctions, equilibia, etc.)
- Ability to model and analyze social or economic phenomena using the ideas tools of game theory
- Ability to reason strategically, in a variety of economic settings

Prerequisites

Previous courses: *Introduction to Game Theory* (for UPF students). While we are going to review some of the main ideas/concepts from that course at the beginning of the term, some previous exposure to game theory is recommended.

A good background in mathematics: algebra, probability theory, optimization. This course is in the MQA (Advanced Quantitative Methods) track, which means that this is a demanding course, with a strong quantitative content.

Contents

1-Preferences, utility, and rationality
2-Dominance, iterated dominance, and rationalizability
3-Nash, Mixed and Correlated equilibrium
4-Dynamic games with complete information
5-Repeated games; Bargaining games
6-Games with asymmetric and incomplete information
7-Auctions and Mechanism Design
8-Dynamic games with incomplete information

Teaching Methods

Students are supposed to do the following weekly assignments:

- Attending the theory classes
- Individual study: solving and reviewing problems, reviewing the material taught in class.
- Attending the seminars and handing in the assigned problem sets.

Class Rules

No plagiarism, cheating or copying will be tolerated. If detected, the grades of all involved parties may be reduced down to Fail and reported to the Dean's office.

Activities Planning

Seminars: weeks 3, 5, 6, 7, 8, 9.

Evaluation

- *Problem sets:* there will be several problem sets.
- *Seminar Attendance and Participation*: Attendance to the seminars is compulsory.
- *Midterm Exam*.
- *Final Exam*.

Relative weight for each activity: 20% on Problem Sets, 30% on Midterm, to% on Final Exam

You need an average of 5 or more to pass the course.

There will be a recovery exam for those that don't pass. Only those students who have followed the continuous evaluation can take the recovery exam.

Bibliography and information resources

Reading Materials:
Required readings:
The course will be largely based on my lecture notes and other reading materials that will be distributed on AulaGlobal.

Other suggested textbooks:
- Steve Tadelis, *Game Theory: An Introduction*. Princeton Univ. Press. This is a thorough textbook. it covers the material at a comparable level of formalism as the course.

- Joel Watson (2008). *Strategy: An Introduction to Game Theory (any edition) ed. Norton*. This textbook covers pretty much the same material of the course, though at a slightly less formal level.

- M. Osborne and A. Rubinstein (1994), *A Course in Game Theory*. MIT Press. This textbook covers the material at a slightly more formal level. It can be downloaded for free from the following website: http://arielrubinstein.tau.ac.il/books.html

Any other reference useful for the course will be listed at Aula Global.