UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

Course guide
220686 - 220686 - Game Theory: Non-Cooperative Games

Last modified: 19/04/2023

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 749 - MAT - Department of Mathematics.

Degree: MASTER'S DEGREE IN MANAGEMENT ENGINEERING (Syllabus 2012). (Optional subject).

Academic year: 2023 **ECTS Credits:** 3.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: VICENÇ SALES i INGLÈS

Others: VICENÇ SALES i INGLÈS

PRIOR SKILLS

Basic knowledges of Mathematics and Probabilities.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Generical:
1. Ability to apply knowledge to solve problems in new environments or unfamiliar environments within broader contexts (or multidisciplinary) related to engineering.

TEACHING METHODOLOGY

The teaching methodology will consist of three parts:
- Classroom sessions devoted to presenting the contents.
- Classroom sessions devoted to practical work.
- Self study including complementary exercises and activities.

In (1) the teacher will introduce the theoretical basis of the matter, that is, concepts, methods and results, and will illustrate them by means of suitable examples for ensuring a good comprehension of them.

In (2) applications of the theory to solve a variety of practical examples will be proposed by the teacher. Reasoning, analytical thinking and criticism will be promoted. Exercises to be solved individually or in small groups will also be proposed, as well as activities for self study.

In (3) the students will work with the material presented in (1) and the exercises discussed or proposed in (2), in order to obtain a good knowledge of the topic.

LEARNING OBJECTIVES OF THE SUBJECT

- To discover the subject and methodology of Non-Cooperative Game Theory, a branch of Operations Research devoted to the analysis of conflicts of interest.

- To realize the convenience of applying Non-Cooperative Game Theory to solve problems of management decision-making, illustrated by means of examples of this field.

STUDY LOAD

Type	Hours	Percentage
Hours large group	13,0	17.33
Self study	48,0	64.00
Guided activities	14,0	18.67

Total learning time: 75 h

CONTENTS

I. Non-cooperative constant-sum games

Description:
- Non-cooperative constant-sum games
- Mixed extension of non-cooperative constant-sum games

Specific objectives:
Introduce concepts and methods of Non-Cooperative Constant-Sum Games.

Related activities:
All

Full-or-part-time: 37h 30m
Theory classes: 6h 30m
Guided activities: 7h
Self study : 24h

II. Non-cooperative games with arbitrary sum

Description:
- Non-cooperative games with arbitrary sum
- Mixed extension of non-cooperative games with arbitrary sum

Specific objectives:
Introduce concepts and methods of Non-Cooperative Game Theory with arbitrary sum.

Related activities:
All

Full-or-part-time: 37h 30m
Theory classes: 6h 30m
Guided activities: 7h
Self study : 24h

ACTIVITIES

1. Theory sessions

Description:
Lectures

Specific objectives:
Introduce concepts and methods of Non-Cooperative Game Theory

Material:
See 'Bibliography' and 'Other resources'

Full-or-part-time: 8h
Theory classes: 8h

2. Guided activities

Description:
Approach and resolution of problems

Specific objectives:
Assimilate concepts and methods of Non-Cooperative Game Theory

Material:
See 'Bibliography' and 'Other resources'

Full-or-part-time: 14h
Guided activities: 14h

3. Examination

Description:
Examination

Specific objectives:
Evaluation

Material:
Bibliography

Full-or-part-time: 5h
Theory classes: 5h

4. Self study

Description:
Approach and resolution of problems

Specific objectives:
Study of concepts and methods of Non-Cooperative Game Theory

Material:
See 'Bibliography' and 'Other resources'

Full-or-part-time: 48h
Self study: 48h

GRADING SYSTEM

The final mark will be obtained by weighting activities as follows:
- Examination (weight: 50%)
- Exercises (weight: 50%)

In case of Exercises are failed but the Exam is passed, Exercicis will be considered passed with a mark of 5.

EXAMINATION RULES.

Examination will be at individual level. Exercises might be occasionally allowed to be solved by small groups.

BIBLIOGRAPHY

Complementary:

- Carreras, F.; Magaña, A.; Amer, R. Teoría de juegos [on line]. Barcelona: Edicions UPC, 2001 [Consultation: 13/10/2020]. Available on: http://hdl.handle.net/2099.3/36427. ISBN 8483014777.

RESOURCES

Hyperlink:
- https://atenea.upc.edu/moodle/login/index.php

Other resources:
- Teoria de Jocs: Jocs No Cooperatius. Transparències (available in Atenea)
- Teoria de Jocs: Jocs No Cooperatius. Problemes resolts (available in Atenea)
- Teoria de Jocs: Jocs No Cooperatius. Problemes (available in Atenea)