Course guide

220686 - 220686 - Game Theory: Non-Cooperative Games

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: 2022  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

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>48.0</td>
<td>64.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>13.0</td>
<td>17.33</td>
</tr>
<tr>
<td>Guided activities</td>
<td>14.0</td>
<td>18.67</td>
</tr>
</tbody>
</table>

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:

**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)