220552 - Quantitative Methods in Management

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 732 - OE - Department of Management
Academic year: 2017
Degree: MASTER'S DEGREE IN MANAGEMENT ENGINEERING (Syllabus 2012). (Teaching unit Compulsory)
ECTS credits: 5  Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: Irene Trullás

Degree competences to which the subject contributes

Specific:
1. Acquire concepts and techniques related to descriptive and statistical inference.
2. Acquire concepts and techniques relating to quantitative and experimental methods for analysis and decision making.
3. Apply quantitative and experimental methods for making decisions in situations where intangibles appear.

Generical:
4. Ability to apply knowledge to solve problems in new environments or unfamiliar environments within broader contexts (or multidisciplinary) related to engineering.
5. Self-learning capacity to independent continuous training.
6. Ability to integrate knowledge and formulate judgments with the aim of making decisions based on information that, with incomplete or limited include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.
The course Quantitative Methods in Management introduces students to the concepts, principles and fundamentals of linear programming, integer-mixed linear programming, Markov chains for analysis and decision making in different contexts.

### Teaching methodology

The course is divided into three parts:

- **Theory classes**
- **Practical classes**
- **Self-study for doing exercises and activities.**

In the theory classes, teachers will introduce the theoretical basis of the concepts, methods and results and illustrate them with examples appropriate to facilitate their understanding.

In the practical classes (in the classroom), teachers guide students in applying theoretical concepts to solve problems, always using critical reasoning. We propose that students solve exercises in and outside the classroom, to promote contact and use the basic tools needed to solve problems.

Students, independently, need to work on the materials provided by teachers and the outcomes of the sessions of exercises/problems, in order to fix and assimilate the concepts.

The teachers provide the curriculum and monitoring of activities (by ATENEA).

### Learning objectives of the subject

The course Quantitative Methods in Management introduces students to the concepts, principles and fundamentals of linear programming, integer-mixed linear programming, Markov chains for analysis and decision making in different contexts.

### Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group: 8h</th>
<th>6.40%</th>
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<tbody>
<tr>
<td></td>
<td>Hours medium group: 15h</td>
<td>12.00%</td>
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<tr>
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<td>Guided activities: 22h</td>
<td>17.60%</td>
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<td>Self study: 80h</td>
<td>64.00%</td>
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## Content

<table>
<thead>
<tr>
<th>Module 1: Linear programming</th>
<th>Learning time: 62h 30m</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 4h</td>
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<tr>
<td></td>
<td>Practical classes: 7h 30m</td>
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<td>Guided activities: 11h</td>
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<td>Self study: 40h</td>
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### Description:
- Introduction to quantitative methods
- Fundamentals of linear programming basis
- Duality and sensitivity analysis
- Integer-Mixed linear programming
- The transport problem

<table>
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<tr>
<th>Module 2: Markov chains</th>
<th>Learning time: 62h 30m</th>
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<tbody>
<tr>
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<td>Theory classes: 4h</td>
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<tr>
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<td>Guided activities: 11h</td>
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<tr>
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<td>Self study: 40h</td>
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### Description:
- Fundamentals of Markov chains
- Simple Markov chains
- Markov chains with remuneration
- Markov chains with remuneration and decision
- Dynamic Programming

## Qualification system

The final grade depends on the following assessment criteria:

- Mid-semester exam 1, weight: 35%
- Mid-semester exam 2, weight: 35%
- Activities and/or Project, weight: 30%

All students unable to attend the mid-semester exams, or failing it, will have the option of repeating it with the final exam.
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Bibliography

Basic:
