220561 - Tools for Decision Analysis

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 732 - OE - Department of Management
Academic year: 2018
Degree: MASTER’S DEGREE IN MANAGEMENT ENGINEERING (Syllabus 2012). (Teaching unit Compulsory)
ECTS credits: 5
Teaching languages: Catalan, Spanish, English

Teaching staff
Coordinator: Carles Ferrer Ferrer
Others: Frederic Garriga

Degree competences to which the subject contributes

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

General:
3. Ability to apply knowledge to solve problems in new environments or unfamiliar environments within broader contexts (or multidisciplinary) related to engineering.
4. 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.
5. Self-learning capacity to independent continuous training.
220561 - Tools for Decision Analysis

**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 combinatorial problems, graph theory and queue theory 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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 15h</td>
<td>12.00%</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 22h</td>
<td>17.60%</td>
</tr>
<tr>
<td></td>
<td>Self study: 80h</td>
<td>64.00%</td>
</tr>
</tbody>
</table>
## Content

<table>
<thead>
<tr>
<th>Module 1: Combinatorial problems</th>
<th>Learning time: 71h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 7h</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 10h</td>
</tr>
<tr>
<td></td>
<td>Self study: 50h</td>
</tr>
</tbody>
</table>

**Description:**
- Foundations of combinatorial problems
- Heuristics for combinatorial problems
- Targeted screening procedures

<table>
<thead>
<tr>
<th>Module 2: Graph theory</th>
<th>Learning time: 27h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 6h</td>
</tr>
<tr>
<td></td>
<td>Self study: 15h</td>
</tr>
</tbody>
</table>

**Description:**
- Graph basics
- Graph topology
- Modeling using graphs
- Road problems
- Flow problems

<table>
<thead>
<tr>
<th>Module 3: Queue theory</th>
<th>Learning time: 27h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 6h</td>
</tr>
<tr>
<td></td>
<td>Self study: 15h</td>
</tr>
</tbody>
</table>

**Description:**
- Fundamentals of queue models
- Birth and death processes
- Models based on birth and death processes
- Costs of a waiting line
220561 - Tools for Decision Analysis

**Qualification system**

The final grade depends on the following assessment criteria:

- Mid-semester exam 1, weight: 35%
- Mid-semester exam 2, weight: 35%
- Project and activities, 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.

**Bibliography**

**Basic:**
