240ST015 - Quantitative Methods in Supply Chain

Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering
Teaching unit: 732 - OE - Department of Management
Academic year: 2018
Degree: MASTER'S DEGREE IN SUPPLY CHAIN, TRANSPORT AND MOBILITY MANAGEMENT (Syllabus 2014). (Teaching unit Compulsory) MASTER'S DEGREE IN STATISTICS AND OPERATIONS RESEARCH (Syllabus 2013). (Teaching unit Optional)
ECTS credits: 5
Teaching languages: Spanish

Teaching staff
Coordinator: García Villoria, Alberto
Others: García Villoria, Alberto
Calleja Sanz, Gema

Degree competences to which the subject contributes

Specific:
CESC4. Know and apply the techniques of modeling, simulation and optimization to solve the problems involved the design and management of supply chains.

Teaching methodology

The teaching methodology is divided in three parts:

- Face-to-face sessions of master classes
- Face-to-face sessions of practical work (exercises and problems)
- Autonomous study work

In the exposition sessions of the contents, the Professor will introduce the theory basis of the material, concepts, methods and results illustrating them with convenient examples to help its understanding.

In the class sessions of practical work, the Professor will guide the students in the application of the theory concepts to solve the problems, developing at all times the critical thinking. Exercises will be proposed to the student, and he or she will have to solve it in class and, if they are not finished, they will have to be carried out out of class, in order to favour the use of the basic tools for the resolution of problems.

The student, in an autonomous way, must work the contents of the course exposed by the Professor and the result of the practical work sessions to assimilate and fix the concepts.

Learning objectives of the subject

The course Quantitative Methods in Supply Chain introduces the student to the modelling concepts, principles and basis by the non-linear, linear and integer programming, the resolution of the non-linear, linear and integer programming, the graph theory and the simulation theory, for the analysis and decision making.
240ST015 - Quantitative Methods in Supply Chain

<table>
<thead>
<tr>
<th>Study load</th>
<th>Hours large group:</th>
<th>Hours medium group:</th>
<th>Hours small group:</th>
<th>Guided activities:</th>
<th>Self study:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total learning time:</strong></td>
<td>0h</td>
<td>30h</td>
<td>15h</td>
<td>0h</td>
<td>80h</td>
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<tr>
<td></td>
<td></td>
<td>0.00%</td>
<td>24.00%</td>
<td>12.00%</td>
<td>64.00%</td>
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</tbody>
</table>
## Content

<table>
<thead>
<tr>
<th>Módulo 1: Teoría de grafos</th>
<th>Learning time: 30h</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 4h 20m</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 6h 28m</td>
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<tr>
<td></td>
<td>Self study: 19h 12m</td>
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</tbody>
</table>

**Description:**

<table>
<thead>
<tr>
<th>Módulo 2: Modelización mediante programación lineal y entera</th>
<th>Learning time: 50h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 7h 12m</td>
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<tr>
<td></td>
<td>Laboratory classes: 10h 48m</td>
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<tr>
<td></td>
<td>Self study: 32h</td>
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</tbody>
</table>

**Description:**
Concepto de programa matemático y de programa lineal. Programas lineales y programas lineales enteros-mixtos. Técnicas de modelización.

<table>
<thead>
<tr>
<th>Módulo 3: Resolución de la programación lineal y entera</th>
<th>Learning time: 7h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 1h 05m</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 1h 37m</td>
</tr>
<tr>
<td></td>
<td>Self study: 4h 48m</td>
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</tbody>
</table>

**Description:**
Introducción a la resolución de programas lineales y a los algoritmos de resolución de programas lineales enteros-mixtos. Paquetes informáticos.

<table>
<thead>
<tr>
<th>Módulo 4: Introducción a la modelización y resolución de la optimización no lineal</th>
<th>Learning time: 7h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 1h 05m</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 1h 37m</td>
</tr>
<tr>
<td></td>
<td>Self study: 4h 48m</td>
</tr>
</tbody>
</table>

**Description:**
Concepto de programa no lineal. Introducción a las técnicas de resolución.
**Módulo 5: Simulación**

**Learning time:** 30h

- Theory classes: 4h 20m
- Laboratory classes: 6h 28m
- Self study: 19h 12m

**Description:**


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**Qualification system**

The qualification of the student will be the following:

Final mark = \( \max(0.6 \times \text{Nef} + 0.2 \times \text{Npp}; 0.8 \times \text{Nef}) + 0.2 \times \text{Nep} \)

Where:

- Nef: Mark of the final exam
- Npp: Mark of the partial exam
- Nep: Mark of practical learning

Reevaluation exam. A written exam is performed on the date determined by the School. Only students who have suspended the subject can be presented (in any case a student that has passed can do the reevaluation exam). The test will re-evaluate the theoretical lessons and the note of said examination will only replace the note of the re-evaluated parts: the final and partial exam mark. In all cases the student can carry all the material that he/she considers suitable, except computers and mobile phones.

Thus, the mark of the student will be the following:

Final mark = 0.8 \times \text{Nre} + 0.2 \times \text{Nep}

Where:

- Nre: Mark of the reevaluation exam
- Nep: Mark of practical learning

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**Regulations for carrying out activities**

In order to carry out the partial evaluation of the theoretical teaching (Npp) a short written examination is carried out. In order to carry out the final evaluation of the theoretical teaching (Nef) a written examination is carried out on the day determined by the School. For the evaluation of the practical lessons (Nep) is performed a short written exam about the practical exercises in the same date in which the final exam is performed. In all cases the student can bring all the material they consider appropriate, except computer, tablet and mobile phone.
Bibliography

Basic:


Others resources: