200617 - PE - Stochastic Optimization

**Coordinating unit:** 200 - FME - School of Mathematics and Statistics

**Teaching unit:** 715 - EIO - Department of Statistics and Operations Research

**Academic year:** 2018

**Degree:** MASTER'S DEGREE IN STATISTICS AND OPERATIONS RESEARCH (Syllabus 2013). (Teaching unit Optional)

**ECTS credits:** 5  
**Teaching languages:** English

### Teaching staff

**Coordinator:** JORDI CASTRO PÉREZ

**Others:** Segon quadrimestre:  
   JORDI CASTRO PÉREZ - A  
   FRANCISCO JAVIER HEREDIA CERVERA - A

### Prior skills

Basic knowledge of Operations Research / Optimization / Mathematical Programming and Modelling.

### Requirements

Introductory course to Operations Research.  

### Degree competences to which the subject contributes

#### Specific:

3. CE-2. Ability to master the proper terminology in a field that is necessary to apply statistical or operations research models and methods to solve real problems.

4. CE-3. Ability to formulate, analyze and validate models applicable to practical problems. Ability to select the method and / or statistical or operations research technique more appropriate to apply this model to the situation or problem.

5. CE-5. Ability to formulate and solve real problems of decision-making in different application areas being able to choose the statistical method and the optimization algorithm more suitable in every occasion.

#### Transversal:

1. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

2. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.
The course aims to introduce students to the problems of system modeling in the presence of uncertainty and familiarize them with techniques and algorithms for addressing these issues. It focuses on stochastic programming, where optimization problems involve random variables. The course content includes stochastic modeling and programming basics, with the goal of enabling students to identify, model, formulate, and solve decision-making problems with both deterministic and random variables.

**Abilities to Be Acquired:**
- Identifying when a problem is suitable to be modeled and solved as a stochastic optimization problem.
- Formulating stochastic optimization problems and determining decisions in the first, second, and subsequent stages.
- Knowledge of the basic properties of stochastic optimization problems.
- Knowledge of specialized solution methods for stochastic problems.
- Knowledge and use of software for solving stochastic problems.

### Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group:</th>
<th>30h</th>
<th>24.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group:</td>
<td>0h</td>
<td></td>
<td>0.00%</td>
</tr>
<tr>
<td>Hours small group:</td>
<td>15h</td>
<td></td>
<td>12.00%</td>
</tr>
<tr>
<td>Guided activities:</td>
<td>0h</td>
<td></td>
<td>0.00%</td>
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<tr>
<td>Self study:</td>
<td>80h</td>
<td></td>
<td>64.00%</td>
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</tbody>
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The course content will be presented and discussed through board explanations and transparencies. Problems will be interwoven with theory and case studies, and solved during laboratory sessions. The course can be delivered in English, Catalan, or Spanish.
## Content

**Introduction.**

<table>
<thead>
<tr>
<th>Learning time: 60h</th>
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</thead>
<tbody>
<tr>
<td>Theory classes: 38h</td>
</tr>
<tr>
<td>Practical classes: 10h</td>
</tr>
<tr>
<td>Laboratory classes: 12h</td>
</tr>
</tbody>
</table>

**Description:**
Presentation. Stochastic Programming in OR. Relation to other stochastic methods.

### Stochastic modelling.

**Degree competences to which the content contributes:**

**Description:**

### Basic Properties.

**Degree competences to which the content contributes:**

**Description:**

### Solution methods.

**Degree competences to which the content contributes:**

**Description:**

## Qualification system

Exam and completion of classwork. The final mark is 65% of exam and 35% classwork.
Bibliography

Basic:

