Course guides
310509 - 310509 - Models and Decision Tools

Unit in charge: Barcelona School of Building Construction
Teaching unit: 732 - OE - Department of Management.
Degree: MASTER'S DEGREE IN BUILDING CONSTRUCTION MANAGEMENT (Syllabus 2015). (Optional subject).
Academic year: 2020  ECTS Credits: 5.0  Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: Sallan Leyes, Jose Maria
Others: Sallan Leyes, Jose Maria

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE16MUGE. Integrate acquired competences in the building management field, for carrying out the final master project

General:
CG1MUGE. Apply the acquired knowledge in solving complex problems in any sector of the building management.
CG4MUGE. Analyse, evaluate and synthesise critically, the information to propose solutions or alternatives to situations arising from building management processes.

Transversal:
06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.
05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.

Basic:
CB10. The students must possess the learning abilities which allow them to continue studying in a way which should be to a large extent self-directed and autonomous.
CB8. The students must be able to integrate knowledges and front to the complexity to formulate opinions from an information which, being incomplete or limited, includes reflections about the social and ethical responsibilities linked to the application of their knowledges and opinions.
CB7. The students must be able to apply the acquired knowledges and their ability of resolution of problems in new or little known environments inside more wide environments (or multidisciplinary) related with their study field.
CB9. The students must be able to communicate their conclusions and the knowledges and ultimate reasons which support to specialised and non-specialised audiences in a clear mode and without ambiguities.

TEACHING METHODOLOGY
LEARNING OBJECTIVES OF THE SUBJECT

In the current business environment, it is increasingly common to make decisions based on the analysis of data obtained from IT, as well as open data supports. In the context of construction industry, it is foreseeable that the analysis of the data obtained from the smart cities systems will be increasingly relevant.

For this reason, the objectives of the course are:
- Introduce the concept of business analytics for the support of decision making in the company
- Train the student to use data analysis tools, so that he / she is able to acquire and pre-process the data, analyze them and present the results of the analysis.
- Introduce business analytics techniques to solve problems in the context of the construction industry.
- Train the student to learn to use other business analytics techniques autonomously.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>15,0</td>
<td>12.00</td>
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<tr>
<td>Self study</td>
<td>90,0</td>
<td>72.00</td>
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<tr>
<td>Hours small group</td>
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<td>4.00</td>
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<tr>
<td>Hours medium group</td>
<td>5,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>10,0</td>
<td>8.00</td>
</tr>
</tbody>
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Total learning time: 125 h

CONTENTS

- Introduction and analytics tools

  **Description:**
  Introduction:
  Models and decision-making tools and business analytics.
  Descriptive, predictive and prescriptive analytics
  Machine learning, data mining, big data

  Introduction to R for business analytics:
  Introducing R and RStudio
  Basic functionalities: Data structures, file reading, expanding R with packages
  Writing reports with R Markdown
  Acquiring and cleaning data
  Analysis of data with graphics
  Statistical analysis of data: measures of dispersion and association

  **Full-or-part-time:** 8h
  Theory classes: 8h
**Descriptive analytics techniques**

**Description:**
Linear models:
Analyzing the relationship between dependent and independent variables with regression analysis
Linear regression with R
Results of the regression model.
Predictions with linear regression.

Generalized linear models:
Binary dependent variable: logit and probit models
Variable depending on count: Poisson and negative binomial models

Classification techniques:
Cluster analysis
Trees

Association rules

**Full-or-part-time:** 12h
Theory classes: 12h

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**Predictive analytics**

**Description:**
Design of a prediction study: sets of training, test and validation.
Evaluation of prediction studies: ROC curves, sampling errors
Performing predictions with R: the empty package

**Full-or-part-time:** 10h
Theory classes: 10h

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**GRADING SYSTEM**