Course guide
205077 - 205077 - Data Mining and Machine Learning for Engineers

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 723 - CS - Department of Computer Science.
Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Optional subject).
MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Optional subject).
MASTER'S DEGREE IN SPACE AND AERONAUTICAL ENGINEERING (Syllabus 2016). (Optional subject).
Academic year: 2023
ECTS Credits: 3.0
Languages: English

LECTURER
Coordinating lecturer: Alfredo Vellido
Others:

TEACHING METHODOLOGY
The course will develop as a mix of general lectures (theory sessions) imparted with the aid of powerpoint presentations and interactive tasks in which the whole class will debate on specific issues triggered by the reading of a limited number of key studies on the different topics of the course.

LEARNING OBJECTIVES OF THE SUBJECT
Networked computer environments are permeating all fields of human activity. This context is a continuous source of data and the use of this data for knowledge generation is the main aim of Data Mining (DM). The world of engineering is part of this paradigm shift towards data-based methods and can benefit from the integration of DM methodologies. The main general learning objective of this course is to serve as a gentle introduction to the concept of DM as a methodology for knowledge discovery. From there, we aim to provide students with the foundations to explore the many possible applications of DM to engineering problems.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>10,5</td>
<td>14.00</td>
</tr>
<tr>
<td>Self study</td>
<td>48,0</td>
<td>64.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>16,5</td>
<td>22.00</td>
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</tbody>
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Total learning time: 75 h
## CONTENTS

### Module 1: Introduction to Data Mining

**Description:**
Data Mining as an Umbrella concept. Defining the boundaries of the field

**Full-or-part-time:** 8h  
Theory classes: 2h  
Self study : 6h

### Module 2: Data Mining as a Methodology

**Description:**
Linking the concepts of Data Mining and Knowledge Discovery in Databases (KDD)  
Data Mining as a structured methodology: CRISP DM

**Full-or-part-time:** 14h  
Theory classes: 6h  
Self study : 8h

### Module 3: Topics in Data Mining

**Description:**
Machine Learning for Data Mining,  
Information visualization,  
Interpretability and Ethics in Data Mining

**Related activities:**
Brief essay

**Full-or-part-time:** 22h  
Theory classes: 8h  
Self study : 14h

### Module 4: Data Mining General Case Studies

**Description:**
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**Full-or-part-time:** 12h  
Theory classes: 4h  
Self study : 8h
Module 5: Data Mining Case Studies in Engineering

Description:

Related activities:
Essay/experimental study

Full-or-part-time: 19h
Theory classes: 7h
Self study: 12h

GRADING SYSTEM

This course will be evaluated through individual essays written by students on different proposed topics. The essays could be either theoretical, experimental, or mixtures of both.

BIBLIOGRAPHY

Basic:

Complementary: