# 1. OVERVIEW

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|---|---|
| **Subject area** | Data Engineering I |
| **Degree** | Bachelor's Degree in Business Analytics |
| **School/Faculty** | Faculty of Economics, Business, and Communication Sciences |
| **Year** | 2nd |
| **ECTS** | 6 |
| **Type** | Compulsory |
| **Language(s)** | Spanish/English |
| **Delivery Mode** | On campus |
| **Semester** | 2nd |
| **Year** | 2024-25 |
| **Coordinating professor** | José Antonio Lozano |

# 2. INTRODUCTION

Data Engineering is focused on the processing of large volumes of information. Therefore, students will analyse ways of adding information, such as distributed databases, data warehouses and cloud databases. The final stage focuses on Big Data, with the objective of managing large volumes of information. This requires unstructured architecture which prioritises efficiency in access.

# 3. SKILLS AND LEARNING OUTCOMES

**Basic skills (CB, by its acronym in Spanish):**

- CB4 - Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

**Cross-curricular skills (CT, by the acronym in Spanish):**

- CT2 - Independent learning: A range of skills for choosing research, analysis, evaluation and information management strategies from different sources, as well as to learn and put into practice what has been independently learnt.

- CT4 - Written communication / Oral communication: Ability to communicate and gather information, ideas, opinions and viewpoints in order to understand and be able to act upon them, whether they are through spoken word and gestures, or through written word and/or visual aids.

**Specific skills (CE, by the acronym in Spanish):**

- CE20 - Ability to develop a study plan of business variables and indicators.
- CE21 - Ability to segment and select the appropriate target audience to the interests of each business initiative.
- CE22 - Ability to select and apply the most appropriate analytical tools to each situation of the company.

- CE23 - Ability to select, parameterize, and analyse metrics related to information sources according to each area (marketing, finance, etc.)
- CE24 - Ability to identify the information needs, depending on the set objectives.
- CE26 - Critical thinking and objectivity to question the data and truths assumed on the basis of preceding data.
- CE28 - Ability to understand and know the "data cycle": data acquisition and creation, construction of information, analysis and visualisation.
- CE29 - Ability to ask the right questions in relation to the expected knowledge objective, so that they can be translated into the appropriate queries that must then be formulated on the data storage system.
- CE31 - Ability to manage uncertainty due to constantly changing information sources.
- CE33 - Ability to handle computer tools for statistical processing and other tools such as simulators with ease and technical solvency.

**Learning outcomes (RA, by the acronym in Spanish):**

- RA1: Be familiar with some of the main databases and technologies used for data storage.
- RA2: Recognise the importance of data science.
- RA3: Describe machine learning techniques, select the most appropriate and design a solution to a given problem which incorporates them.
- RA4: Learn how to deal with problems of high dimensionality in the field of Big Data, relating them to real cases and argue their evolution and future applications.
- RA5: Know when to use supervised and non-supervised learning techniques.
- RA6: Use data visualization to improve analysis interpretation, making use of specific languages and environments.
- RA7: Know of different cases of machine learning techniques used in the business and corporate environment.
- RA8: Be familiar with the main problems that a data analysist could face and how to overcome them.

The following table shows how the skills developed in the subject area relate to the intended learning outcomes:

| Skills | Learning outcomes (RA, by the acronym in Spanish) |
|---|---|
| CB4, CT2, CT4, CE31 | RA1, RA2 |
| CE24, CE29, CE31 | RA3 |
| CE22, CE25 | RA4, RA5 |
| CE20, CE21, CE23, CE28, CE26, CE29, CE33, CE31 | RA6, RA7, RA8 |

## 4. CONTENTS

Foundations of data management in large volumes
Non-conventional databases. NoSQL.
Types of NoSQL databases and semi-structured data
Introduction to Python and data engineering libraries
Introduction to supervised and non-supervised classification
Exploratory analysis techniques (clustering)
Data mining processes
Validation methods in the learning process
Introduction to linear learning systems: case studies on linear regression and logistical regression
Selection and extraction of characteristics: case studies on dimensionality reduction techniques (PCA, LDA)
Inductive learning and decision trees: case study on automatic rule generation
Introduction to deep learning

## 5. TEACHING-LEARNING METHODS

The types of teaching-learning methods are as follows:

- Lecture / Web conference
- Case studies
- Problem-based learning
- Workshop-based learning

## 6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

| Learning activity | Number of hours |
|---|---|
| Tutorials | 10 |
| Lectures | 20 |
| Asynchronous lectures | 10 |
| Case studies | 15 |
| Problem-solving | 20 |
| Writing reports and papers | 15 |
| Independent working | 30 |
| Workshops and/or laboratory work | 30 |
| **TOTAL** | **150** |

# 7. ASSESSMENT

The assessment systems, plus their weighting in the final grade for the subject area, are as follows:

**On campus:**

| Assessment system | Weighting |
|---|---|
| On-campus theory exams | 30.0 |
| Oral presentations | 20.0 |
| Case study/problem scenario | 25.0 |
| Laboratory work | 25.0 |

On the Virtual Campus, when you open the subject area, you can see all the details of your assessable tasks and the deadlines and assessment procedures for each task.

## 7.1. Ordinary exam period

To pass the subject area in the ordinary exam period you must obtain a grade higher than or equal to 5.0 out of 10.0 in the final grade (weighted average) for the subject area.

In any case, it is necessary that you obtain a grade higher than or equal to 4.0 in the final exam, so that it can be averaged with the rest of the tasks.

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## 7.2. Extraordinary exam period (resits)

To pass the subject area in the ordinary exam period you must obtain a grade higher than or equal to 5.0 out of 10.0 in the final grade (weighted average) for the subject area.

In any case, it is necessary that you obtain a grade higher than or equal to 4.0 in the final exam, so that it can be averaged with the rest of the tasks.

Tasks not passed in the ordinary exam period, or those not delivered, must now be delivered after having received the relevant corrections to them by the teacher.

# 8. TIMELINE

The timeline with delivery dates of assessable tasks in the subject area is indicated in this section:

| Assessable tasks | Date |
|---|---|
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| | |

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|---|---|
| | |

The timeline may be subject to modifications for logistical reasons. Students will be informed of any changes in due time and course.

## 10. EDUCATIONAL GUIDANCE, DIVERSITY AND INCLUSION UNIT

From the Educational Guidance and Diversity Unit we offer support to our students throughout their university life to help them reach their academic achievements. Other main actions are the students inclusions with specific educational needs, universal accessibility on the different campuses of the university and equal opportunities.

From this unit we offer to our students:

1. Accompaniment and follow-up by means of counselling and personalized plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made in terms of methodology and assessment for those students with specific educational needs, pursuing an equal opportunities for all students.
3. We offer students different extracurricular resources to develop different competences that will encourage their personal and professional development.
4. Vocational guidance through the provision of tools and counselling to students with vocational doubts or who believe they have made a mistake in their choice of degree.

Students in need of educational support can write to us at:
orientacioneducativa@universidadeuropea.es

## 11. STUDENT SATISFACTION SURVEYS

Your opinion matters!

Universidad Europea encourages you to complete our satisfaction surveys to identify strengths and areas for improvement for staff, the degree and the learning process.

These surveys will be available in the surveys area of your virtual campus or by email.

Your opinion is essential to improve the quality of the degree.

Many thanks for taking part.