1. OVERVIEW

Subject area	Artificial Intelligence
Degree	Bachelor's Degree in Computer Engineering
School/Faculty	Architecture, Engineering and Design
Year	Third
ECTS	6 ECTS
Type	Compulsory
Language(s)	Spanish
Delivery mode	On campus / Online
Semester	First semester
Year	2022/2023
Coordinating professor	Gabriel Marín Díaz

2. INTRODUCTION

Artificial Intelligence (AI) is a compulsory subject within the Degree in Computer Engineering, worth 6 ECTS credits.

This subject complements the rest of the subjects within the degree programme, as its area of application is very extensive: from fields such as robotics to intelligent decision-making based on information analysis, including the search for documents.

Due to the large area of knowledge that Artificial Intelligence covers, the main aim of this subject area is to provide students with the subject's main techniques and fields of application. Although not all branches of Artificial Intelligence will be covered in detail, the student will have a solid foundation of the most relevant ones, so that he/she will be able to tackle the development of AI-related projects in the future.

3. SKILLS AND LEARNING OUTCOMES

Basic skills (CB, by the acronym in Spanish):

- CB4: Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.
- CB5: Students have developed the learning skills necessary to undertake further study in a much more independent manner.
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Transversal skills (CT, by the acronym in Spanish):

CT14: Ability to propose and invent new, original solutions that contribute towards improving problem situations, including ideas from other contexts.

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

CE21: Knowledge and application of the fundamental principles and basic techniques of intelligent systems and their practical application.

CE29: Ability to acquire, obtain, formalise and represent human knowledge in a computable form to solve problems through a computer system in any field of application, particularly those related to aspects of computing, perception and
behaviour in intelligent environments.

Learning outcomes (RA, by the acronym in Spanish):
RA5: Design algorithms for automatic problem-solving.
RA6: Use data mining techniques and machine learning for information processing.
RA7: Use natural language processing techniques.
RA8: Design computer vision algorithms and techniques.
The following table shows how the skills developed in the subject area match up with the intended learning outcomes:

Skills	Learning outcomes
CB4, CB5, CT14, CE21, CE29	RA5: Use algorithms based on Artificial Intelligence for problem-solving.
CB4, CB5, CT14, CE21, CE29	RA6: Use data mining techniques to process information.
CB4, CB5, CT14, CE21, CE29	RA7.Use natural language processing techniques.
CB4, CB5, CT14, CE21, CE29	RA8. Design computer vision algorithms and techniques.

4. CONTENTS

The subject is organised into six learning units, which in turn are divided into topics:

Unit 1. Introduction and problem-solving.
- Topic 1. Introduction to artificial intelligence.
- Topic 2. Intelligent agents.
- Topic 3. Problem-solving through searches.
- Topic 4. Theory of games
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Unit 2. Probability and Bayesian Networks
- Topic 1. Introduction to Bayesian networks
- Topic 2. Probability
- Topic 3. Complex Bayesian networks

Unit 3. Data mining and intelligent information access systems.
- Topic 1. Introduction to data mining and machine learning
- Topic 2. Data extraction, data transformation and data loading
- Topic 3. Data representation and visualisation.

Unit 4. Machine learning.
- Topic 1. Supervised learning
- Topic 2. Non-supervised learning
- Topic 3. Neural networks

Unit 5. Natural language processing
- Topic 1. Introduction to natural language processing.
- Topic 2. Statistical natural language processing.
- Topic 3. Knowledge-based natural language processing.
- Topic 4. Natural language processing applications.

Unit 6. Final project

- Topic 1. Introduction and presentation of cases.

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Lecture.
- Laboratory work.
- Group research.
- Simulation.
- Practical case studies.
- Fieldwork and conferences.

6. LEARNING ACTIVITIES

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

On campus:

Learning activity (AF, by the acronym in Spanish)	Number of hours
Lectures	50
Group work	25
Independent working	50
Tutorials, academic monitoring and assessment	25
TOTAL	**150**

Online:

Learning activity (AF, by the acronym in Spanish)	Number of hours
Independent working	50
Independent reading of topics and discussion	50
Group work	25
Tutorials, academic monitoring and assessment	25
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
Exams	30%
Development of articles, reports or design briefs	30%
Alternative assessment methods, recap of what has been learnt	25%
Case studies	15%

Online:

Assessment system	Weighting
Knowledge test	60%
Development of articles, reports or design briefs	20%
Exercises, problems and case studies	20%

On the Campus Virtual, when you open the subject area, you will find 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 will need a grade of at least 5.0 out of 10.0 in the final grade (weighted average) for the subject area.
In the practical continuous assessment activities, you must have at least 70% class attendance (on-campus delivery mode only).

In any case, you will need a grade of at least 4.0 in the final test for it to be included in the weighting with the other activities.

7.2. Extraordinary exam period (resits)

To pass the subject area in the extraordinary exam period, you will need a final grade of at least 5.0 out of 10.0 (weighted average) for the subject area.

In any case, you will need a grade of at least 5 in the final test for it to be included in the weighting with the other activities.

Activities not passed in the ordinary exam period, or those not submitted, must be submitted after receiving the relevant corrections and feedback from the lecturer. The subject area professor may change the wording of the assessable tasks to be submitted in respect to the assessable tasks in the ordinary exam period.

8. TIMELINE

The timeline with submission dates for the assessable tasks in this subject area will be indicated in this section:

On campus:

Assessable tasks	Date
Activity 1. Web Scraping with Python	Week 6

Activity 2. AI and ML, case study	Week 12
Activity 3. Interpretability in ML	Week 14
Final Project	Week 16

Online:

Assessable tasks	Date
Activity 1. Traveller Problem	Week 4
Activity 2. Theory of Games	Week 8
Activity 3. Supervised Learning	Week 10
Activity 4. Non-Supervised Learning	Week 12
Activity 5. Natural Language Processing	Week 14
Final Project	Week 16

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

9.BIBLIOGRAFÍA

The reference material for the subject area is as follows:

The recommended bibliography is indicated below:

10. DIVERSITY AWARENESS UNIT

Students with special educational needs:
To ensure equal opportunities, curricular adaptations or adjustments for students with special educational needs will be outlined by the Diversity Awareness Unit (UAD, Spanish acronym).

As an essential requirement, students with special educational needs must obtain a report about the curricular adaptations/adjustments from the Diversity Awareness Unit by contacting unidad.diversidad@universidadeuropea.es at the beginning of each semester.

11. SATISFACTION SURVEYS

Your opinion matters!
Universidad Europea encourages you to complete our satisfaction surveys to identify strengths and areas for improvement for staff, degrees and the learning process.
These surveys will be available in the survey area of your campus virtual or by email.
Your opinion is essential to improve the quality of the degree.
Many thanks for taking part.