1. BASIC INFORMATION

Course	Artificial Intelligence
Degree program	Bachelor's Degree in Computer Engineering
School	Architecture, Engineering and Design
Year	Second
ECTS	6
Credit type	Compulsory
Language(s)	English
Delivery mode	On Campus / on line
Semester	1
Academic year	2025-2026
Coordinating professor	MARIN DIAZ, GABRIEL
Professor	PAGES OGILVIE, CARLOS JAIME

2. PRESENTATION

Artificial Intelligence (AI) is a compulsory subject within the Bachelor's Degree in Engineering Computer Science with a course load of 6 ECTS credits.
This subject is a transversal complement to the rest of the subjects of the degree as its area of application is very extensive: from fields such as robotics to intelligent decision making based on information analysis, through image processing and the analysis of language.
Due to the enormous area of knowledge covered by Artificial Intelligence, the main objective of this subject is to provide students with knowledge of the main techniques and application domains of this subject. Although not all branches of AI will be covered exhaustively, the student will have a solid base in the most relevant ones, so that he/she will be able to face the development of projects related to them in the future

3. LEARNING OUTCOMES

Knowledge
KN17 Knowledge and application of the fundamental principles and basic techniques of intelligent systems and their practical application.
KN20 Ability to have in-depth knowledge of the fundamental principles and models of computation and the ability to apply them to interpret, select, evaluate, model, and create new concepts, theories, uses, and technological developments related to computer science.

Skills

SK09 Ability to understand the foundations, paradigms, and techniques of intelligent systems, analyze, design, and develop computer systems, services, and applications that utilize these techniques in any field of application.

SK10 Ability to acquire, obtain, formalize, and represent human knowledge in a computable form for problem-solving through a computer system in any field of application, particularly those related to aspects of computing, perception, and action in intelligent environments.

SK12 Ability to apply and develop machine learning techniques and design and implement applications and systems that utilize them, including those dedicated to automatic extraction of information and knowledge from large volumes of data.

Competences

CP08 Ability to analyze and assess the social and environmental impact of technical solutions, understanding the ethical and professional responsibility of the Computer Engineering Technician's activity.

Specific learning outcomes for the subject

Subject-Specific Knowledge

- Know the main techniques of intelligent systems.
- Analyze the ethical and social repercussions of AI.
- Describe the data mining process, identifying the algorithms, methods, and tools that can be used at each stage.

Subject-Specific Skills

- Design artificial vision algorithms and techniques.
- Use natural language processing techniques for the development of applications and services.
- Design algorithms for automatic problem solving.

4. CONTENT

Artificial Intelligence: Definition of Artificial Intelligence, goals, history and approaches, main techniques.

Problem Solving and Game Theory. Problems in the state space model. Algorithm design. Basic concepts of Game Theory.

Knowledge Representation and Probabilistic Reasoning. Knowledge representation using propositional and first-order logic, and rule-based systems. Basic probability concepts and presents Bayesian Networks as a probabilistic reasoning model.

Data Management for Analysis and Data Mining: Introduction to Data Warehouses and OLAP for analytical data management. Data mining process, preparation, representation, and data visualization.

Machine Learning: Introduction to Machine Learning, its main types (supervised, unsupervised). Fundamentals of Neural Networks.

Application Areas: Computer Vision. Fundamentals and techniques and practical applications. Fundamentals and techniques of Computer Vision, basic concepts of image processing and detection.

Ethics in Artificial Intelligence: Ethical and social implications of AI, bias, privacy, accountability, and transparency. Ethics in autonomous systems and malicious use, ethical frameworks and regulations.

5. TEACHING-LEARNING METHODOLOGIES

The types of teaching-learning methodologies used are indicated below:

- Master class
- Problem-based learning
- Project-based learning
- Workshop-based learning

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

Campus-based mode:

Learning activity	Number of hours	Time in Class	Use of IA
Masterclasses	12	12	Not allowed
Practical application masterclasses	18	18	Not allowed / Suggested
Case studies	0	0	Not allowed
Problem solving	24	12	Not allowed / Suggested
Report and writing	0	0	Not allowed
Research and projects	16	6	Allowed
Oral presentations	0	0	Not allowed
Workshop and/or laboratory activities	6	6	Allowed
Designing intetrventation strategies and plans	0	0	Not allowed
Autonomous work	68	0	Not allowed / Suggested
Debates and colloquiums	4	4	Not allowed
Face-to-face assessment tests	2	2	Not allowed
TOTAL	**150**	**60**	

* The teacher may specify a different use for a specific activity within the subject if he/she deems it appropriate and advises the students accordingly.

Online mode:

Learning activity	Number of hours	Virtual	Use of IA
Multimedia didactic resources	12	0	Not allowed
Synchronous virtual classes	18	18	Not allowed / Suggested
Problem solving	24	0	Not allowed / Suggested
Project development	16	0	Allowed
Synchronous activities in workshops and/or virtual labs	6	6	Allowed
Study of contents and complementary documentation (Autonomous Work)	68	0	Not allowed / Suggested
Virtual forum	4	0	Not allowed
Virtual assessment tests	2	2	Not allowed
TOTAL	**150**	**26**	

* The teacher may specify a different use for a specific activity within the subject if he/she deems it appropriate and advises the students accordingly.

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Campus-based mode:

Assessment system	Weight
Face-to-face assessment tests	30%
Oral presentations	
Reports and writings	20%
Case/problem	10%
Learning portfolio	
Performance assessment	10%
Research and projects	20%
Strategy design work and intervention plans	
Laboratory/workshop practical notebook	10%

Online mode:

Assessment system	Weight
Face-to-face assessment tests	40%
Oral presentations	
Reports and writings	20%
Case/problem	
Learning portfolio	
Performance assessment	10%
Research and projects	20%
Strategy design work and intervention plans	
Laboratory/workshop practical notebook	10%

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

7.1. First exam period

To pass the course in the first exam period, you must obtain a final course grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 4.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

The teacher reserves the right to request an additional test to any of the evaluation tests, in case of doubts about the student's authorship.

In order to pass the course, attendance is compulsory and, therefore, the minimum number established for the course by the teacher must be reached. In this case it will be 50%.

7.2. Second exam period

To pass the course in the second exam period, you must obtain a final grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 4.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

The student must deliver the activities not successfully completed in the first exam period after having received the corresponding corrections from the professor, or those that were not delivered in the first place.

8. SCHEDULE

This table shows the delivery deadline for each assessable activity in the course:

Assessable activities	Deadline
Participation Activities (individual and group)	Week 1-18
Knowledge Test (individual)	Week 10
Mini-project delivery (group) and Checkpoint	Week 17-18
Global Knowledge Test	Week 18

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any change as and when appropriate.

9. BIBLIOGRAFÍA

The recommended Bibliography is:

Artificial Intelligence: A Guide for Thinking Humans
Author: Melanie Mitchell (2023 edition)

- Clear and accessible approach with a thoughtful critique.
- Excellent for understanding the modern context of AI and its limitations.
- Ideal for ethical and social discussions with technical depth.

Artificial Intelligence: A Modern Approach (4th Edition)
Authors: Stuart Russell & Peter Norvig (2021)

- The gold standard in AI textbooks, now updated.
- Covers intelligent agents, logic, learning, planning, NLP, and more.
- Extensive but essential.

Deep Learning
Authors: Ian Goodfellow, Yoshua Bengio, Aaron Courville (MIT Press, 2016 – still fundamental)

- The technical classic on deep neural networks.
- Includes theory, algorithms, and real-world applications.
- Foundational for any serious deep learning course.

Foundations of Machine Learning (2nd Edition)
Authors: Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar (2023)

- Mathematically rigorous yet accessible.
- Ideal for engineering students who want to go deeper.
- Covers SVMs, PAC learning, neural networks, and more.

Neural Networks and Deep Learning: A Textbook
Author: Charu C. Aggarwal (2nd Edition, 2023)

- Widely used in universities; includes theory and practical applications.
- Focuses on neural networks, CNNs, RNNs, and current trends.
- Balanced between theory and code.

10. EDUCATIONAL GUIDANCE AND DIVERSITY 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. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the “surveys” section in virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.