

## SUBJECT TEACHING GUIDE

### G655 - Introduction to Intelligent Systems

Degree in Computer Systems Engineering  
 First Degree in Computer Systems Engineering  
 Degree in Mathematics  
 Degree in Mathematics

Academic year 2024-2025

1. IDENTIFYING DATA			
Degree	Degree in Computer Systems Engineering First Degree in Computer Systems Engineering Degree in Mathematics Degree in Mathematics	Type and Year	Compulsory. Year 3 Compulsory. Year 3
Faculty	Faculty of Sciences		
Discipline	Subject Area: Computer Programming Mention in Computer Science Compulsory Module		
Course unit title and code	G655 - Introduction to Intelligent Systems		
Number of ECTS credits allocated	6	Term	Semester based (1)
Web	<a href="https://aulavirtual.unican.es">https://aulavirtual.unican.es</a>		
Language of instruction	Spanish	English Friendly	Yes Mode of delivery Face-to-face

Department	DPTO. MATEMATICAS, ESTADISTICA Y COMPUTACION
Name of lecturer	INES GONZALEZ RODRIGUEZ
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Other lecturers	PABLO GARCIA GOMEZ

### 3.1 LEARNING OUTCOMES

- Understand the essential components and capabilities of an intelligent system, following the intelligent agent model.
- Learn and be able to apply basic mechanisms and algorithms for solution search: non-informed and heuristic search, approximate search (evolutionary algorithms, local search, etc), search in constraint-satisfaction problems and adversarial search.
- Learn and be able to apply basic mechanisms of logic-based knowledge representation and reasoning.
- Learn and be able to apply concepts, models and basic algorithms of classical planning.
- Learn and be able to apply concepts, and basic algorithms of machine learning.
- Acquire certain skill to identify real problems that are suited to be solved with intelligent systems methods due to having features such as computational complexity, imprecision in the objectives, etc.
- Be able to analyse a real problem and model it in order to be solved with Artificial Intelligence techniques : be able to abstract the relevant aspects of the problem and choose the adequate knowledge representation and inference method to obtain solutions.

### 4. OBJECTIVES

- Learn the basic concepts and techniques of Artificial Intelligence (search and knowledge representation and their application to planning and learning) and be able to apply such techniques to problems of academic nature but inspired in real-life problems.
- Identify real-life problems that, given their computational complexity, goal imprecision, etc are appropriate to be solved using artificial intelligence methods.
- Provide enough knowledge to analyse a simple real problem and model it to be solved with Artificial Intelligence techniques , that is, be able to abstract the relevant aspects of the problem and choose the adequate model to represent the problem and find solutions.
- Introduce the basic ideas and techniques underlying the design of intelligent computer systems, offering a global and unifying view under the concept of intelligent agent.

### 6. SUBJECT PROGRAM

#### CONTENTS

1	Introduction: definition of AI, brief history and applications; concept of intelligent agent.
2	Search for problem solving: <ul style="list-style-type: none"> <li>- Introduction to search systems</li> <li>- Informed search</li> <li>- Local and approximate search</li> <li>- Constraint satisfaction problems</li> <li>- Adversarial search</li> </ul>
3	Knowledge representation and reasoning: <ul style="list-style-type: none"> <li>- Logical agents</li> <li>- Inference</li> </ul>
4	Applications and extensions: <ul style="list-style-type: none"> <li>- Introduction to classical planning</li> <li>- Introduction to learning</li> </ul>

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Closed-book written exam including theoretical and problem-solving questions.	Written exam	Yes	Yes	50,00
Programming assignments combined with in-class online assessment	Others	No	Yes	30,00
Coursework activities, such as essays, oral presentations, problem solving, online quizzes, etc.	Others	No	Yes	20,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
<p>The exact nature of coursework activities will depend on the course progress and the students' needs and interests. The goal is to provide feedback to the students as well as coordinating coursework activities with the remaining courses.</p> <p>The grades of the programming assignments can be regained by resubmitting the assignments with appropriate changes before the extraordinary written exam. The grades corresponding to the remaining coursework activities can be regained with an additional question in the extraordinary written exam.</p>				
<b>Observations for part-time students</b>				
<p>Part-time students must sit for the written exam with the rest of the students. For the remaining activities, alternative formulae will be agreed between the student and the lecturer, taking into account the student's circumstances. The student will always have the opportunity to regain the grades as the rest of students.</p>				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
<b>BASIC</b>
S. Russell y P. Norvig. "Artificial Intelligence. A Modern Approach", Pearson, 4th Global Ed. (2022) <a href="http://aima.cs.berkeley.edu/">http://aima.cs.berkeley.edu/</a>
D. L. Poole, A. K. Mackworth. "Artificial Intelligence Foundations of Computational Agents", 2nd. Ed. Cambridge University Press (2017) <a href="http://artint.info/index.html">http://artint.info/index.html</a>