

## SUBJECT TEACHING GUIDE

### 1102 - Intelligent Process Control

#### Master's Degree in Industrial Engineering Master's Degree in Industrial Engineering Research

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Master's Degree in Industrial Engineering Master's Degree in Industrial Engineering Research			Type and Year	Optional. Year 2 Optional. Year 1
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Electroenergetic Module Electromechanic / Mechatronics Module Advanced Techniques in Automation				
Course unit title and code	1102 - Intelligent Process Control				
Number of ECTS credits allocated	5	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. TECNOLOGIA ELECTRONICA E INGENIERIA DE SISTEMAS Y AUTOMATICA				
Name of lecturer	LUCIANO ALONSO RENTERIA				
E-mail	luciano.alonso@unican.es				
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 2. DESPACHO (S2022)				
Other lecturers	MARIA SANDRA ROBLA GOMEZ				

3.1 LEARNING OUTCOMES	
- Capacity and skills in the design of fuzzy control systems, expert systems, neural networks and Genetic algorithms for industrial process control	
- Study of complex process control problems	
- Capacity in Technical Decision based on Artificial Intelligence	

#### 4. OBJECTIVES

Show new approaches to design control systems based on artificial intelligence tools, that they have emerged in recent decades.  
 Know in depth the A.I. tools used in the control of complex processes, highly nonlinear or uncertainty

#### 6. SUBJECT PROGRAM

##### CONTENTS

1	Fuzzy systems. Membership functions Rulebase. Fuzzification. Inference Engine Defuzzification. Examples
2	Neural networks. Elements. Types of neurons. Network architectures. Training. Topology. Types of networks. Practical examples
3	Genetic algorithms. Basic elements. Generation of the population. Chromosomes Evaluation and selection of individuals. Crossbreeding, mutation, reinsertion. Examples

#### 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
First theory exam	Written exam	No	Yes	30,00
First laboratory practical exam	Laboratory evaluation	No	Yes	20,00
Final theory exam	Written exam	Yes	Yes	30,00
Final laboratory practice exam	Laboratory evaluation	Yes	Yes	20,00
<b>TOTAL</b>				<b>100,00</b>
Observations				
If it cannot be carried out in person due to the health situation, the evaluation tests will be carried out remotely.				
Observations for part-time students				
Part-time students may choose to be evaluated like the rest of the students, or through a single final exam with a theoretical part (60%) and a practical part (40%)				

#### 8. BIBLIOGRAPHY AND TEACHING MATERIALS

##### BASIC

- J.R. Llata, E. González Sarabia. 2003. Introducción a las Técnicas de Inteligencia Artificial. Ediciones TDG,
- Earl Cox. 1994. The fuzzy systems handbook: a practitioner's guide to building, using, and maintaining fuzzy systems. Academic Press, Inc. ISBN 0-12-194270-8
- Adedeji B. Badiru, John Y. Cheung. 2002. Fuzzy engineering expert systems with neural network applications. John Wiley & Sons. ISBN 0-471-29331-8
- Thomas Weise. 2009. Global Optimization Algorithms. Theory and Application. <http://www.it-weise.de/>

