



**Teaching Guide**

Identifying Data					2023/24
Subject (*)	Intelligent IoT	Code	614544023		
Study programme	Máster Universitario en Intelixencia Artificial				
Descriptors					
Cycle	Period	Year	Type	Credits	
Official Master's Degree	1st four-month period	Second	Optional	3	
Language	English				
Teaching method	Face-to-face				
Prerequisites					
Department	Enxeñaría de Computadores				
Coordinador		E-mail			
Lecturers	Blanco Novoa, Óscar	E-mail	o.blanco@udc.es		
Web	<a href="http://campusvirtual.udc.gal/">http://campusvirtual.udc.gal/</a>				
General description	The main objective of this course is to deliver the basic knowledge of IoT technologies and their application in the creation of intelligent devices through the use of AI techniques.				

**Study programme competences**

Code	Study programme competences
A8	CE07 - Ability to understand the consequences of the development of an explainable and interpretable intelligent system
A9	CE08 - Ability to design and develop secure intelligent systems, in terms of integrity, confidentiality and robustness
A10	CE09 - Ability to obtain a deep knowledge about fundamental principles and models of quantum computing and to apply them for the interpretation, selection, evaluation, modelling and creation of new concepts, theories, uses and technological developments related to Artificial Intelligence
A14	CE13 - Knowledge of computer tools in the field of data analysis and statistical modelling and ability to select those ones most suitable for problem solving
A15	CE14 - Understanding and command of the main machine learning techniques, including those devised for big volumes of data. Understanding and command of basic concepts and techniques for information search and filtering in big collections of data.
A16	CE15 - Knowledge of computer tools in the field of machine learning and ability to select those ones most suitable for problem solving
A20	CE19 - Knowledge of the different environments where AI based technologies can be applied and awareness of their capability to provide a differentiating added value
A21	CE20 - Ability to combine and adapt different techniques, extrapolating knowledge among different application domains
A22	CE21 - Knowledge of the techniques that facilitate the efficient organisation and management of AI projects in real environments, including resources management and tasks scheduling and taking into account the concepts of knowledge dissemination and open science
A23	CE22 - Knowledge of the techniques that facilitate the security of data, applications and communications and the derived consequences on different application domains in AI
A28	CE27 - Understanding the significance of the entrepreneurial culture and knowledge of the resources within the entrepreneur person's means
A29	CE28 - Appropriate knowledge of the concept of enterprise, its organisation and management, and of the different business sectors, with the goal of providing solutions from the AI perspective
A30	CE29 - Being able to apply knowledge, abilities and attitudes to the business and professional world, by planning, managing and evaluating projects in the scope of AI
A31	CE30 - Being able to set out, model and solve problems that require the application of AI methods, techniques and technologies
B1	CG01 - Maintaining and extending theoretical foundations to allow the introduction and exploitation of new and advanced technologies in the field of AI
B2	CG02 - Successfully addressing each and every stage of an AI project
B4	CG04 - Suitably elaborating written essays or motivated arguments, including some point of originality, writing plans, work projects, scientific papers and formulating reasonable hypotheses in the field
B5	CG05 - Working in teams, especially of multidisciplinary nature, and being skilled in the management of time, people and decision making



B6	CB01 - Acquiring and understanding knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, frequently in a research context
B7	CB02 - The students will be able to apply the acquired knowledge and to use their capacity of solving problems in new or poorly explored environments inside wider (or multidisciplinary) contexts related to their field of study
B9	CB04 - The students will be able to communicate their conclusions, their premises and their ultimate justifications, both to specialised and non-specialised audiences, using a clear style language, free from ambiguities
B10	CB05 - The students will acquire learning abilities to allow them to continue studying in way that will mostly be self-directed or autonomous
C5	CT05 - Understanding the importance of the entrepreneurial culture and knowledge of the resources within the entrepreneur person's means
C8	CT08 - Appreciating the importance of research, innovation and technological development in the socioeconomic and cultural progress of society
C9	CT09 - Being able to manage time and resources: outlining plans, prioritising activities, identifying criticisms, fixing deadlines and sticking to them

**Learning outcomes**

Learning outcomes	Study programme competences		
To know and to analyze the implication of remote intelligent sensing in the environment. To know how decentralized data analysis techniques work in perimeter or federated learning environments.	AC7	BC1	CC5
	AC8	BC2	CC8
	AC9	BC4	CC9
	AC13	BC5	
	AC14	BC6	
	AC15	BC7	
	AC19	BC9	
	AC20	BC10	
	AC21		
	AC22		
	AC27		
	AC28		
	AC29		
AC30			

**Contents**

Topic	Sub-topic
Topic 1	Essential concepts of intelligent IoT
Topic 2	Hardware and software platforms for intelligent IoT
Topic 3	IoT protocols for the creation of intelligent systems
Topic 4	Deploying AI in IoT devices: decentralized inference models
Topic 5	Intelligent monitoring

**Planning**

Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A8 A10 A15 A28 B1 B6 C5 C8	10	10	20
ICT practicals	A9 A14 A16 A21 A31 B2 B5 C9	11	11	22
Mixed objective/subjective test	A20 A22 A23 A29 A30 B4 B7 B9 B10	1	31	32
Personalized attention		1	0	1



(\*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	Lectures on the content of the subject
ICT practicals	ICT practicals to put in practice the concepts learned on the lectures
Mixed objective/subjective test	Test to assess the learned practical and theoretical concepts

Personalized attention	
Methodologies	Description
ICT practicals	The professors will tutor the students and will guide them during the practical lessons and the supervised project.

Assessment			
Methodologies	Competencies	Description	Qualification
ICT practicals	A9 A14 A16 A21 A31 B2 B5 C9	Evaluation of the results and knowledge acquired during the ICT practicals	50
Mixed objective/subjective test	A20 A22 A23 A29 A30 B4 B7 B9 B10	Evaluation of the competences acquired in the subject	50

Assessment comments
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**FIRST CALL** The evaluation of the subject will be carried out through a final written test, which will account for 50% of the final grade.

The completion of the ICT practicals practices is mandatory to pass the course and will suppose 50% of the final grade. This evaluation will be carried out based on the work developed in the laboratory.

To pass the course, a minimum grade of 4 points out of 10 will be required for both the written exam and the ICT practicals. The student who do not take the final written test will be reflected in the university grade record as **NOT PRESENTED**.

Part-time students and with attendance exemption academic waiver: it will not be required the attendance to the practical lessons, which will be flexible with the delivery and defence dates. In the same way, tutoring will be adapted to the scheduling restrictions of the part-time students.

**SECOND CALL** In case of failing the subject in the first call, the evaluation obtained on the practical activity carried out will be maintained for the second opportunity if the grade is higher than 50% of the awarded grade. In the event that it is not greater than 50%, the student, on the second opportunity, will take a written test, which will account for 70% of the grade, and a practical exam, which will provide the other 30%.

The fraudulent performance of tests or assessment activities, once verified, will directly involve the qualification of failed in the call in which it is committed: the student will be qualified with "failed" (numerical grade 0) in the corresponding call of the academic year, both if the offense is committed in the first opportunity as in the second. For this, the qualification will be modified in the first opportunity report, if necessary.

The previously described evaluation process applies to both new enrollment students and repeating students.

### Sources of information

<b>Basic</b>	<ul style="list-style-type: none"> <li>- Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos David Boyle (2014). From Machine-to-Machine to the Internet of Things: Introduction to a new Age of Intelligence. Academic Press</li> <li>- Peter Waher (2015). Learning Internet of Things. Packt Publishing</li> <li>- Samuel Greengard (2015). The Internet of Things. MIT Press</li> <li>- S. P. Yadav, B. S. Bhati, D. P. Mahato, S. Kumar (2022). Federated Learning for IoT Applications. Springer</li> </ul>
<b>Complementary</b>	<ul style="list-style-type: none"> <li>- Vijay Madiseti, Arshdeep Bahga (2014). Internet of Things (A Hands-on-Approach). VPT</li> <li>- Adrian McEwen, Hakim Cassimally (2013). Designing the Internet of Things. Wiley</li> </ul>

### Recommendations

**Subjects that it is recommended to have taken before**

**Subjects that are recommended to be taken simultaneously**

**Subjects that continue the syllabus**



## Other comments

Due to the high correlation between the concepts developed in the lectures and the contents of the practicals, it is recommended the students perseverance in the study of the subject, attending the practical sessions with the concepts already worked on. With the completion of the ICT practicals such concepts will be consolidated, thus facilitating the study and understanding of the subject. This subject will comply with the different regulations for university teaching, respecting the gender perspective (e.g. non-sexist language will be used).

**(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.**