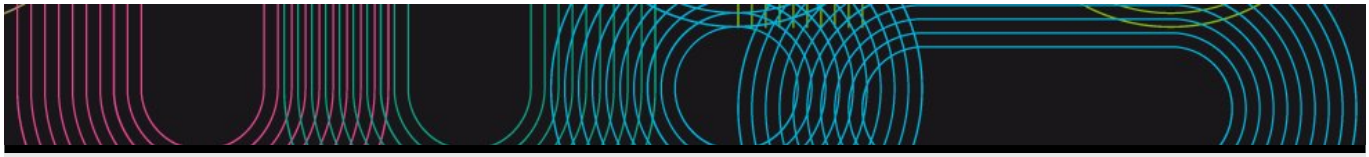

IDENTIFYING DATA				
Industrial Internet of Things (IIoT)				
Subject	Industrial Internet of Things (IIoT)			
Code	V04M183V01201			
Study programme	Máster Universitario en Industria 4.0			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	4.5	Mandatory	1st	2nd
Teaching language	Spanish Galician English			
Department				
Coordinator	Garrido Campos, Julio			
Lecturers	Garrido Campos, Julio Riveiro Fernández, Enrique			
E-mail	jgarri@uvigo.es			
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General description	The problem of access to machine information is a key aspect within the digitization of industrial processes promoted by the Industry 4.0 paradigm, and it is the IIoT technologies that lead to its implementation. With these technologies it is possible to connect ubiquitously with a controller and access a series of variables. The course uses an industrial approach when analyzing the different methodologies to access data of the industrial process. It focuses on giving a clear vision of the architectures used that are having a greater impact in the framework of Industry 4.0. To this end, all the elements involved in the chain of transmission and exploitation of industrial data will be analysed: the different hardware architectures, software communication resources and the most used data protocols (MQTT, AMQP, OPC UA), and finally, their storage. With this, students should have a clear idea of what strategy and methodology is currently used when implementing data access in industrial environments.			

Training and Learning Results	
Code	
A1	Possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context
A2	Students should be able to apply their acquired knowledge and problem-solving skills in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
A5	Students have got the learning skills that will enable them to continue studying in a largely self-directed or autonomous manner
B1	Organization and planning skills
B2	Problem solving.
B7	Computer skills related to the field of study.
C9	Know the principles, techniques and systems that comprise the concept of Industrial Internet of Things (IIoT) and its relationship with design and manufacturing
C10	Knowing how to implement robust, flexible and fault-tolerant industrial control systems, through data acquisition and decision making systems appropriate to each situation.
D1	Ability to understand the meaning and application of the gender perspective in different areas of knowledge and in professional practice with the aim of achieving a more just and equal society
D2	Incorporate criteria of sustainability and environmental commitment into professional practice. To acquire skills in the equitable, responsible and efficient use of resources
D3	Multidisciplinary teamwork

Expected results from this subject	
Expected results from this subject	Training and Learning Results

To know the principles, techniques and systems that comprise the concept of Industrial Internet of Things (IIoT).	A1 B7 C9
To know the application of the IIoT in the design and the manufacture in the frame of the Industry 4.0	A1 A2 C9 C10
Know the robust, reliable and fault-tolerant control systems best suited for applications in Industry 4.0.	A1 A2 B1 B2
Implement data acquisition and decision making systems based on IIoT in manufacturing and supply chain contexts	A2 A5 B1 C10 D1 D2 D3
Apply control systems for real time decision making in Industry 4.0 contexts.	A2 B1 B2 C10

Contents

Topic	
1. Industrial Internet of Things in Industry 4.0.	1.1 Introduction to IIoT. Historical evolution. 1.2 Technological alternatives
2. Nature, principles, techniques and systems associated with IIoT	2.1 IIoT Architectures 2.2 IIoT Hardware devices 2.3 IIoT Protocols
3. IIoT applied to design and manufacture.	3.1. Control systems in the context of Industry 4.0. 3.2. IIoT systems in production facilities 3.3. IIoT systems in the supply chain

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practical	10	30	40
Project based learning	8	24	32
Lecturing	10	30	40
Objective questions exam	0.5	0	0.5

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

Methodologies

	Description
Laboratory practical	Activities to apply the knowledge acquired in theory classes to certain situations that can be developed in the subject's laboratory
Project based learning	The students, individually, will have to design and implement a system (or a part of it) proposed by the teacher applying the knowledge and skills acquired as a result of the master sessions, the laboratory practices and the personal work of the student.
Lecturing	Presentation by the teacher of the contents of the subject.

Personalized assistance

Methodologies	Description
Laboratory practical	Develop and provide a script to guide the resolution of the problem or activities. Monitoring and evaluating the activities.
Project based learning	Design a real project that allows the students to improve their skills
Tests	**Description**
Objective questions exam	- Review of evidence and evaluation activities. - Communication of results (publication of grades and data and/or review procedure)

Assessment

	Description	Qualification	Training and Learning Results		
Laboratory practical	It is necessary to exceed 50% of the assessment to pass the course. There will be continuous evaluation.	20	B2 B7	C10	D1 D2 D3
Project based learning	It is necessary to exceed 50% of the assessment to pass the course. There will be continuous evaluation.	30	B1 B7	C9 C10	
Lecturing	(*)Avaliarase a asistencia as sesión expositivas e as achegas solicitadas conforme os requisitos concretos.	20	B2 B7	C9 C10	
Objective questions exam	Tests that evaluate knowledge that include closed questions with different answer alternatives (true/false, multiple choice, matching of elements...). Students select an answer from a limited number of possibilities. The test of objective questions evaluates knowledge. It does not evaluate skills or attitudes. Objectives: To assess lower thinking skills. Assesses knowledge, understanding and application.	30	A1 A2 A5	B1 B2	C9

Other comments on the Evaluation

Students who do not pass the subject in continuous training at the first opportunity of each academic year, in which the distribution of evaluation weights is as stablished above, will have the possibility of having an exam of objective questions, worth 100% of the final mark, in successive calls that are not the first opportunity of each academic year.

Ethical commitment: Students are expected to behave ethically. If unethical behaviour is detected (copying, plagiarism, use of unauthorised electronic devices,...), the student will be considered to be ineligible to pass the subject. Depending on the type of unethical behaviour detected, it could be concluded that the student has not reached the necessary skills to overcome the subject. Students are expected to behave in a respectful and dignified manner and to collaborate with the teaching system, teaching staff, coordination and administrative and services personnel of the Master's degree. Any question due to the lack of ethical and dignified behaviour of the student body may have repercussions on the evaluation of the subject.

Sources of information

Basic Bibliography

Julio Garrido Campos, **Transparencias asignatura**,

GENG, Hwaiyu (ed.)., **Internet of things and data analytics handbook**, John Wiley & Sons, 2017

Complementary Bibliography

MAHNKE, Wolfgang; LEITNER, Stefan-Helmut; DAMM, Matthias, **OPC unified architecture**, Springer Science & Business Media, 2009

Recommendations