Guía Docente				
Datos Identificativos				2021/22
Asignatura (*)	Internet das Cousas Aplicado á Industria (IIoT)		Código	730542015
Titulación				
Descriptores				
Ciclo	Período	Curso	Tipo	Créditos
Mestrado Oficial	2º cuadrimestre	Primeiro	Optativa	6
Idioma	Inglés			
Modalidade docente	Presencial			
Prerrequisitos				
Departamento	Ciencias da Computación e Tecnoloxías da InformaciónEnxeñaría Industrial			
Coordinación	Becerra Permuy, Jose Antonio	Correo electrónico	jose.antonio.becerra.permuy@udc.es	
Profesorado	Becerra Permuy, Jose Antonio Quintián Pardo, Héctor	Correo electrónico	jose.antonio.becerra.permuy@udc.es hector.quintian@udc.es	
Web				
Descrición xeral	This course is focused on providing the students with practical knowledge in the Internet of Things (IoT) and, specifically, regarding its application to industrial environments (Industrial Internet of Things, IIoT). The theoretical lessons will cover a broad view of all relevant aspects of IoT, while practical lessons will prepare the students for carrying out the implementation of those theoretical concepts.			
Plan de continxencia	1. Modifications to the contents No changes will be made. 2. Methodologies * Teaching methodologies that are maintained All methodologies are maintained. * Teaching methodologies that are modified All methodologies will have to be adapted. Thus, lectures, laboratory practices, supervised project, and exam will be carried out using Teams and / or Moodle. The presentation of the supervised project will also be done through Teams. The physical devices used in all the methodologies will be replaced by simulators or they will be given to the students (depending on the final number of students enrolled and the availability of material). 3. Mechanisms for personalized attention to students Except for in-office tutorials, the same personalized attention mechanisms are maintained, namely: videoconferencing and messaging by Teams, Moodle and email, in this order of preference. Additionally, if the teaching staff observes that there are doubts common to a group of students, small group tutorials can be scheduled through videoconference by Teams. 4. Changes in the evaluation * Evaluation observations: There are no changes to the evaluation, apart from the fact that it will be carried out online using Moodle or Teams. 5. Modifications to the bibliography or webgraphy All the recommended bibliography was acquired by the center's library in PDF as well as on paper, so it could be provided to the students. In the event that this is not possible due to a copyright issue, the faculty would provide a free-access substitute.			

Competencias / Resultados do título	
Código	Competencias / Resultados do título

Resultados da aprendizaxe

Resultados de aprendizaxe	Competencias / Resultados do título		
The students will be able to understand and implement the basic theoretical concept of Internet of Things in industrial environments.		BM1 BM2 BM3 BM4 BM5 BM6 BM7 BM10 BM12	CM2 CM3 CM4 CM6 CM7

Contidos	
Temas	Subtemas
Introduction.	- Background and definitions. - Involved technologies. - IoT vs. IIoT. - Relationship with Industry 4.0.
Devices.	- Sensors and endpoints. - Actuators. - Hardware platforms. - Low level communication.
Communication networks.	- Types of networks. - Gateways. - Protocols.
Data processing.	- Edge, fog, and cloud computing. - Data analytics and machine learning application. - Software platforms.
User interfaces.	- Standalone. - Cloud-based.
Security.	- Firewalls. - Encryption. - Authentication.

Planificación				
Metodoloxías / probas	Competencias / Resultados	Horas lectivas (presenciais e virtuais)	Horas traballo autónomo	Horas totais
Sesión maxistral	B2 B6 B8 C2 C3 C4	21	31.5	52.5
Prácticas de laboratorio	B3 B6 B8 C2 C3 C4	21	31.5	52.5
Traballos tutelados	B3 B4 B5 B6 B7 B8 B11 B13 C2 C3 C4 C6 C7	0	39.5	39.5
Proba mixta	B4 B11 B13 C2	1	1.5	2.5
Atención personalizada		3	0	3
*Os datos que aparecen na táboa de planificación son de carácter orientativo, considerando a heteroxeneidade do alumnado				

Metodoloxías	
Metodoloxías	Descrición

Sesión maxistral	Activity in the classroom that serves to establish the fundamental concepts of the subject. It consists of oral presentation making profuse use of audiovisual media and seeking the participation of students by posing practical cases and asking questions, in order to facilitate learning and foster a critical spirit.
Prácticas de laboratorio	Through this activity, students will implement small systems in the laboratory that will exemplify the concepts seen in the lectures, so that they can test some of the methods and techniques in the real world, and assess the problems (and their implications) that arise in the implementation of IoT systems.
Traballos tutelados	Single assignment proposed incrementally, carried out autonomously, and tutored by the teachers, which will involve putting into practice a large part of the concepts seen in the lectures. The work will be done in groups and the students will deliver a report and will also have to make a presentation to the teacher and their classmates.
Proba mixta	It will consist of a written test with short and / or multiple choice questions, in order to check the consolidation of the most important theoretical concepts seen in the subject.

Atención personalizada	
Metodoloxías	**Descrición**
Traballos tutelados Prácticas de laboratorio	Laboratory practice: personalized attention in laboratory practices will consist of solving conceptual or procedural doubts that may arise during students' work. Supervised projects: it will be necessary to show the progress that is being made to offer the appropriate guidance, resolve doubts and ensure the quality of the work. These tutorials will be carried out in groups and in person in the teacher's office or using Teams.

Avaliación			
Metodoloxías	**Competencias / Resultados**	**Descrición**	**Cualificación**
Traballos tutelados	B3 B4 B5 B6 B7 B8 B11 B13 C2 C3 C4 C6 C7	Autonomous work in small groups. It will be necessary to deliver the materials (document and presentation) in a timely manner following the instructions. In addition, it will require oral presentation by all the members of the working group. Not to perform the presentation will result in a score of zero in this activity. General evaluation criteria: * Clarity, length and quality of the working memory. * Clarity and quality of the oral presentation. * Adequacy of the student's answers to the teacher's questions during the presentation. * Attendance to tutoring sessions. Nomenclature used in the observations section for this activity: P: mark obtained in the supervised project (70% of the final mark).	70
Proba mixta	B4 B11 B13 C2	It will consist of a written exam with short and / or multiple choice questions, in order to check the consolidation of the most important theoretical concepts seen in the subject. General evaluation criteria: * Correct answers. Nomenclature used in the observations section for this activity: E: mark obtained in this test (30% of the final mark).	30

Observacións avaliación

In order to pass the subject, the student must meet the following requirements (score between 0 and 10 in all activities):1) P> = 5.2) E> = 5.If all the above requirements are not met, the maximum qualification mark that can be obtained, in the corresponding opportunity, will be 4.5 points. If the required requirements are met, the final mark will be calculated as follows:FINAL MARK = 0.7 × P + 0.3 * EGeneral EMJMD Sustainable Ship and Shipping SEAS 4.0 evaluation rules: - Students will have only two oportunities to pass a course. If failing to do so, they may be forced to leave the degree. - No part time or lecture attendance exemption are allowed in this degree.

Fontes de información	
Bibliografía básica	- Veneri, G., & Capasso, A. (2018). Hands-On Industrial Internet of Things. Packt Publishing Ltd. - Dow, C. (2018). Internet of Things Programming Projects. Packt Publishing Ltd.
Bibliografía complementaria	- Lea, P. (2018). Internet of Things for Architects. Packt Publishing Ltd. - Ravulavaru, A. (2018). Enterprise Internet of Things Handbook. Packt Publishing Ltd.

Recomendacións
Materias que se recomenda ter cursado previamente
Materias que se recomenda cursar simultaneamente
Tecnoloxías Facilitadoras da Industria 4.0/730542010
Materias que continúan o temario
Xemelgos Dixitais en Sistemas Mariños/730542022
Observacións
To help in achieving a sustainable environment and to get the objective of number 5 action of the "Ferrol Green Campus Action Plan" (Healthy and environmentaly and socially sustainable research and teaching):The assignments to be done in this course:- Will be required in digital format.- Will be delivered using Moodle, with no need to print them.In case it is necessary to print them:- Plastics won´t be used.- Two side printing will be used.- Recycled paper will be used.- Printing drafts will be avoided.A sustainable use of the resources should be done, together with the prevention of negative impacts on the environment.