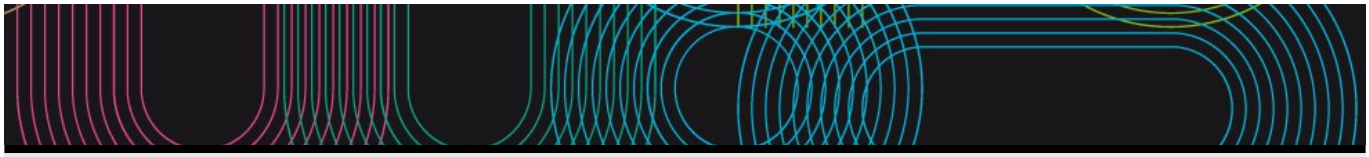

IDENTIFYING DATA				
Smart Manufacturing e Smart logistics				
Subject	Smart Manufacturing e Smart logistics			
Code	V04M183V01106			
Study programme	M.U. Industry 4.0			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Mandatory	1st	1st
Teaching language	Spanish Galician English			
Department				
Coordinator	Peláez Lourido, Gustavo Carlos Tjahjono , Benny Eko			
Lecturers	Peláez Lourido, Gustavo Carlos Sartal Rodríguez, Antonio Tjahjono , Benny Eko			
E-mail	b.tjahjono@cranfield.ac.uk gupelaez@uvigo.es			
Web	http://masterindustria40.webs7.uvigo.es/wordpress/			
General description	This course studies the basic principles of Smart Manufacturing and Smart Logistics, which are based on the exploitation of information accessible through multiple channels, to streamline business models and bring as close as possible the product/process/service customized to the final consumer, understood as the best value-cost perceived by that consumer.			

Skills	
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.
A3	Students are able to integrate knowledge and deal with the complexity of making judgements based on information which, being incomplete or limited, includes reflections on the social and ethical responsibilities linked to the application of their knowledge and judgements.
A4	Students should be able to communicate their findings - and the ultimate knowledge and reasons behind them - to specialist and non-specialist audiences in a clear and unambiguous manner
B1	Organization and planning skills
B6	Knowledge and use of the English language.
B7	Computer skills related to the field of study.
C13	Use the integration of different data sources for the definition of flexible, reliable and efficient supply chain management systems, supported by the Industrial Internet of Things and optimized logistics management software tools
C14	Know the concepts, principles and tools of intelligent manufacturing systems, which facilitate access to information and production data through automated tools for capturing, processing and displaying information
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

Learning outcomes	
Expected results from this subject	Training and Learning Results

Get the understanding of the concepts that underlying Smart Manufacturing and Logistics	A1 B6 B7 C14
Understand the different technologies that can potentially be adopted for Smart Manufacturing and Smart Logistics	A1 A3 B6 B7 C13 C14
Know how to assess Industrial Internet of Things (IIoT) applications in the context of Manufacturing and Logistics	A2 A3 A4 B1 B6 B7 C13 C14 D1 D2
Recognise the benefits and impacts of Smart Manufacturing on the Supply Chain, including Logistics	A3 B1 B6 C13 C14 D1 D2 D3
Understand challenges and threats posed by the underlying technologies to Manufacturing and Logistics	A1 A3 A4 B6 B7 C13 C14 D1 D2 D3

Contents	
Topic	
The roles of manufacturing within the modern supply chain	
Typology of manufacturing systems	
Supply Chain Operations Reference (SCOR) model	
Manufacturing control systems	
Internet of Things applications in the manufacturing/production control systems	
Utilising cloud computing	
Industry 4.0 and its impact in manufacturing and the supply chain	
Benefits and challenges in the adoption of Industry 4.0	(*)- Equipos y dispositivos como □activos inteligentes□ - Herramientas de Análisis de Negocio: Business intelligence. - Optimización de los procesos de Producción. - Sostenibilidad aplicada a la Fábrica Inteligente
Digital Readiness	
Intelligent Factories and Business Intelligence (BI)	- Equipment and devices as "intelligent assets" - Business Analysis Tools: Business intelligence. - Optimization of Production processes. - Sustainability applied to the Intelligent Factory

Planning			
	Class hours	Hours outside the classroom	Total hours
Case studies	5	10	15
Practices through ICT	3	11	14
Portfolio/dossier	0.5	9	9.5

Lecturing	12	12	24
Objective questions exam	0.5	2	2.5
Systematic observation	2	0	2
Presentation	2	6	8

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

Methodologies

	Description
Case studies	Analysis of a fact, problem or real event with the aim to know it, interpret, resolv, generate hypothesis, contrast data, reflect, complete knowledges, diagnosed and train in alternative procedures of solution.
Practices through ICT	Activities of application of knowledge in a given context and acquisition of basic and procedural skills related to the subject, through ICT.
Portfolio/dossier	Compilation of the work of the/the student with the objective to show his efforts, progresses and attainments in an area. The compilation owes to include contents chosen pole student/it, the criteria of selection and evidences of selfreflection.
Lecturing	Lecture by the professor of the content envelope to subject object of study, theoretical bases and/or guidelines of one work, exercise that the student has to develop

Personalized assistance

Methodologies	Description
Practices through ICT	Monitoring and individual evaluation of activities. Even if the activities are carried out autonomously, the students will have tutorial sessions at all times so that the teachers can monitor the activity.
Portfolio/dossier	Preparation of the materials, activities, etc., on which the students will work. Although the activities will be carried out autonomously, the students will have tutorial sessions at all times so that the teachers can monitor the activity
Tests	**Description**
Objective questions exam	Individualized attention to students during the tests. Review of tests and evaluation activities.
Presentation	Tracking the evolution of the workjob and help the students in the preparation of the presentation/exhibition.

Assessment

	Description	Qualification	Training and Learning Results
Portfolio/dossier	Ojectives: Evaluate higher thinking skills. Assess analysis, synthesis and evaluation.	15	A1 B1 C13 D1 A2 B6 D2 A3 A4
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 (preferably four) with a reduction for failure of a value equal to the percentage of success (-0.25 pts. in the case of four possible answers if the value of the question is 1 pt.). The test of objective questions only evaluates knowledge. It does not evaluate skills or attitudes. It evaluates lower thinking. It evaluates knowledge, understanding and application.	20	A1 B7 C14 A3
Systematic observation	Careful, rational, planned and systematic perception to describe and record the manifestations of student behaviour. It is possible to assess learning and actions and how they are carried out by evaluating order, precision, ability, efficiency... The aim is to evaluate higher thinking.	15	A1 B1 C13 D1 A2 B6 D2 A3 D3 A4
Presentation	Presentation by the students to the teacher and/or a group of students of an aspect on the contents of the subject or the results of a work, exercise, project... It can be carried out individually or in a group. In the presentation, knowledge, skills and attitudes are evaluated. The objectives are to evaluate higher thinking (analysis and synthesis).	50	A1 B1 C13 D1 A2 B6 C14 D2 A3 D3 A4

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

Klaus Schwab, **The fourth industrial revolution**, 9781524758868, Random House USA Inc, 2017

Alasdair Gilchrist, **Industry 4.0: the industrial internet of things**, 1484220463, 1st, Apress, 2016

Antonio Sartal, Diego Carou and J. Paulo Davim, **Enabling technologies for the successful deployment of industry 4.0**, 9780367151966, CRC Press, 2020

Tjahjono, B., Esplugues, C., Ares, E., & Pelaez, G., **What does industry 4.0 mean to supply chain?**, https://doi.org/10.1016/j.promfg.2017.09.191, 13, 1175-1182., Procedia Manufacturing, 2017

Gubbi, J., Buyya, R., Marusic, S., & Palaniswami, M., **Internet of Things (IoT): A vision, architectural elements, and future directions.**, https://doi.org/10.1016/j.future.2013.01.010, Elsevier, 2013

Complementary Bibliography

Slama, D., Puhlmann, F., Morrish, J., & Bhatnagar, R. M., **Enterprise IoT: Strategies and Best practices for connected products and services**, 1491924837, 1st, O'Reilly Media, Inc, 2015

Recommendations

Contingency plan

Description

=== EXCEPTIONAL MEASURES SCHEDULED ===
In front of the uncertain and unpredictable evolution of the sanitary alert caused by the COVID- 19, the University establishes an extraordinary planning that will activate in the moment in that the administrations and the own institution determine it attending to criteria of security, health and responsibility, and guaranteeing the teaching in a no face-to-face stage or no totally face-to-face. These already scheduled measures guarantee, in the moment that was prescriptive, the development of the teaching of a way but agile and effective when being known in advance (or with a wide in advance) by the students and the faculty through the tool normalised and institutionalised of the educational guides DOCNET.

=== ADAPTATION OF The METHODOLOGIES ===
The educational methodologies will give , to be necessary, adapting them to the telematic means that put the disposal of the faculty, in addition to the documentation facilitated through FAITIC and other platforms, email, etc.
When it was not possible to face-to-face teaching, in the measure of the possible, will prevail the teaching of the theoretical contents by telematic means as well as those contents of practices of resolution of problems, classroom of computing, and others, that can be virtualized developed by the students of way guided, tried keep the attendance presenciality for the experimental practices of laboratory, whenever the groups fulfil with the rule established in the moment by the pertinent authorities in sanitary matter and of security. In the case of not being able to be given of face-to-face form, those contents no virtualizable will give or replace by other (autonomous work guided, etc.) that allow to achieve equally the competitions associated to them.

* Educational methodologies that keep

* educational Methodologies that modify

* Mechanism no face-to-face of attention to the students (tutorials)
The tuitorials will be able to develop indistinctly of face-to-face form (whenever
it was possible to guarantee the sanitary measures) or telematic (email and others) respecting or adapting the schedules of tutorials planned. Besides, it will do an adaptation methodological to the students of risk, facilitating him additional specific information, to accredit that it can not have access to the contents given of conventional form.
* Modifications (proceed) of the contents to give

* additional Bibliography to facilitate to car-learning

Will be able to be added along the course to facilitate the self-learning

* Other modifications

=== ADAPTATION OF The EVALUATION ===
Will keep those proofs that already come making of telematic form and, in the measure of the possible, will keep the face-to-face proofs adapting them to the valid sanitary rule. The proofs will develop of face-to-face form except Rectoral Resolution that indicates they have to do of form non face-to-face, making gave way through the distinct tools put the disposal of the professors. Those no attainable proofs of telematic form will be replaced by other (deliveries of autonomous work guided, etc.)

* Proofs already made
Proof *XX: [previous Weight 00%] [Weight Proposed 00%]
...

* Pending proofs that keep
Proof *XX: [previous Weight 00%] [Weight Proposed 00%]
...

* Proofs that modify
[previous Proof] => [new Proof]

* New proofs
does not proceed
* additional Information
keep the criteria of evaluation adapting the realisation of the proofs, in the case to be necessary and by indication in Rectoral Resolution, to the telematic means put the disposal of the teachers