Teaching Guide				
Identifying Data				2021/22
Subject (*)	Advanced Production Systems		Code	730497235
Study programme	Mestrado Universitario en Enxeñaría Industrial (plan 2018)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	1st four-month period	Second	Optional	3
Language	Spanish			
Teaching method	Hybrid			
Prerequisites				
Department	Empresa			
Coordinador	Lamas Rodriguez, Adolfo	E-mail	adolfo.lamasr@udc.es	
Lecturers	Lamas Rodriguez, Adolfo	E-mail	adolfo.lamasr@udc.es	
Web	http://www.gii.udc.es/			
General description	A simulación é unha técnica Lean para deseñar e mellorar procesos que desempeña un papel fundamental en Industria 4.0. O propósito desta materia é formar en técnicas de simulación de eventos discretos aplicadas ó deseño de sistemas avanzados de producción. En concreto, veránse problemas de deseño e optimización de plantas de fabricación pertencentes a proxectos de I+D+i reais en donde se aplican modelos de eventos discretos. A materia polo tanto axudará a aprender tanto técnicas de simulación como de mellora e optimización de sistemas de fabricación automatizados e robotizados.			
Contingency plan	1. Modifications to the contents 2. Methodologies *Teaching methodologies that are maintained *Teaching methodologies that are modified 3. Mechanisms for personalized attention to students 4. Modifications in the evaluation *Evaluation observations: 5. Modifications to the bibliography or webgraphy			

Study programme competences / results	
Code	Study programme competences / results
A2	ETI2 - Knowledge and ability to project, calculate and design integrated manufacturing systems.
A8	ETI8 - Ability to design and project automated production systems and advanced process control.
A9	EG1 - Knowledge and skills to organize and manage companies.
A13	EG5 - Knowledge of management information systems, industrial organization, production systems and logistics and quality management systems.
A14	EG6 - Capacities for work organization and human resources management. Knowledge on prevention of occupational risks.
B2	CB7 - That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of ??study.
B3	CB8 - That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on the social and ethical responsibilities linked to the application of their knowledge and judgments.
B5	CB10 - That students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.

B6	G1 - Have adequate knowledge of the scientific and technological aspects in Industrial Engineering.
B13	G8 - Apply the knowledge acquired and solve problems in new or unfamiliar environments within broader and multidisciplinary contexts.
B14	G9 - Be able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
B16	G11 - Possess the learning skills that allow to continue studying in a self-directed or autonomous way.
C1	ABET (a) - An ability to apply knowledge of mathematics, science, and engineering.
C3	ABET (c) - An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
C6	ABET (f) - An understanding of professional and ethical responsibility.
C8	ABET (h) - The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
C11	ABET (k) - An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Learning outcomes			
Learning outcomes	Study programme competences / results		
Coñecementos para o deseño e optimización de sistemas integrados e automatizados de fabricación, organización industrial, sistemas produtivos, control económico e xestión de proxectos.	AJ2 AJ8 AJ9 AJ13 AJ14	BJ2 BJ3 BJ5 BJ6 BJ13 BJ14 BJ16	CJ1 CJ3 CJ6 CJ8 CJ11
Capacidades para a organización do traballo e a xestión de recursos. Coñecementos sobre a xestión de riscos.	AJ2 AJ8 AJ9 AJ13 AJ14	BJ2 BJ3 BJ5 BJ6 BJ13 BJ14 BJ16	CJ1 CJ3 CJ6 CJ8 CJ11

Contents	
Topic	Sub-topic
Fabricación Lean	Flujo pieza a pieza Calidad integrada en el modelo Sistema de producción Pull Producción Nivelada
Fabricación digital	Gemelo Digital de procesos
Industria 4.0	Robotización RV AGVs Gemelo digital
Robotización	Soldadura robotizada Control Dimensional Ensayos no Destructivos

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours

Supervised projects	A2 A8 A9 A13 A14 B2 B3 B5 B13 B14 B16 B6 C1 C3 C6 C8 C11	5	6	11
Guest lecture / keynote speech	A2 A8 A9 A13 A14 B2 B3 B5 B13 B14 B16 B6 C1 C3 C6 C8 C11	10	34	44
ICT practicals	A2 A8 A9 A13 A14 B2 B3 B5 B13 B14 B16 B6 C1 C3 C6 C8 C11	5	15	20
Personalized attention		0		0
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	**Description**
Supervised projects	Resolución de casos prácticos propostos en clase e completados na casa.
Guest lecture / keynote speech	Clases maxistrais sobre simulación de sistemas avanzados de producción
ICT practicals	Resolución de casos de simulación guiados polo profesor.

Personalized attention	
Methodologies	**Description**
Supervised projects Guest lecture / keynote speech ICT practicals	Tutorials for solving doubts and problems found during the course.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Supervised projects	A2 A8 A9 A13 A14 B2 B3 B5 B13 B14 B16 B6 C1 C3 C6 C8 C11	Assessment of the cases solved by the students.	60
ICT practicals	A2 A8 A9 A13 A14 B2 B3 B5 B13 B14 B16 B6 C1 C3 C6 C8 C11	Attendance to the ICT practicals and submission of the solved cases.	40

Assessment comments

First opportunity evaluation: a weighted grade will be calculated according to the weights indicated in the Methodologies.

Second chance evaluation: the same criteria will be followed as for the first chance evaluation.

Advance call: before the date of this call, the student will deliver the works proposed and not approved in the previous calls.

The fraudulent performance of the tests or evaluation activities will automatically imply a failure grade "0" in the corresponding call, thus invalidating any qualification obtained in all the evaluation activities.

The "students with recognition of part-time dedication and academic exemption of attendance exemption" will communicate at the beginning of the course their situation to the teachers of the subject, as established by the "Standard that regulates the regime of dedication to the study of undergraduate students in the UDC "(Art.3.be 4.5) and the" Standards for evaluation, review and claim of the qualifications of the undergraduate and master's degree studies (Art. 3 e 8b). The students in this situation will be evaluated by solving the same practical cases proposed in exercises through ICT practices.

Sources of information	
Basic	- Robinson, Stewart (2004). Simulation : The Practice of Model Development and Use. John Wiley & Sons - Flexsim (2019). Tutoriales de Flexsim. - Yuri Merkuryev & otros (2009). Simulation-Based Case Studies. Springer
Complementary	

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
A sustainable use of resources must be made to prevent the negative impact on the natural environment. For this reason, the delivery of the documentary works carried out in this subject: ? They will be requested in virtual format and / or computer support ? It will be done through Moodle, in digital format without needing to print them ? If it is necessary to make them on paper: a) plastics will not be used, b) double-sided impressions will be made, c) recycled paper will be used, d) the printing of drafts will be avoided.