UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2021/22
Subject (*)	Simulation of Industrial Processes and Optimization		Code	730G04074
Study programme	Grao en Enxeñaría en Tecnoloxías Industriais			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Fourth	Optional	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Empresa			
Coordinador	Garcia del Valle, Alejandro	E-mail	alejandro.garcia.delvalle@udc.es	
Lecturers	Garcia del Valle, Alejandro Lamas Rodriguez, Adolfo	E-mail	alejandro.garcia.delvalle@udc.es adolfo.lamasr@udc.es	
Web				
General description	In this subject you learn to design, model, characterize and optimize production and logistics processes in order to have a digital twin of the process.			
Contingency plan	1. Modifications in the contents: they are not modified 2. Teaching methodologies that are modified: none are modified. 3. Mechanisms of personalized attention to students: · Face-to-face if possible. · By email to teachers. · Using TEAMS. 4. Modifications in the evaluation: they are not modified. 5. Modifications of the bibliography or webography: the bibliography is not modified. The student has notes in digital format and bibliography already provided on the Internet.			

Study programme competences	
Code	Study programme competences
B5	CB5 Que os estudantes desenvolvan aquelas habilidades de aprendizaxe necesarias para emprenderen estudos posteriores cun alto grao de autonomía
B7	B5 Ser capaz de realizar unha análise crítica, avaliación e síntese de ideas novas e complexas
B9	B8 Adquirir unha formación metodolóxica que garanta o desenvolvemento de proxectos de investigación (de carácter cuantitativo e/ou cualitativo) cunha finalidade estratéxica e que contribúan a situarnos na vangarda do coñecemento

Learning outcomes			
Learning outcomes	Study programme competences		
Know how to formulate and solve situation problems where there is randomness.		B5 B7 B9	
Ability to abstract, understand and analyze processes.		B5 B7 B9	
Know how to use simulation software. Solve problems of complex industrial processes.		B5 B7 B9	

Contents	
Topic	Sub-topic

The following topics develop the contents established in the tab of the Verification Memory that are:	Simulation. Modeling and simulation. Discrete Event Simulation. Concepts used in simulation of discrete events. Advanced simulation techniques.
Discrete Event Simulation: concepts.	Introduction. Simulation applications. Systems, models and simulation. Types of simulation. The modeling process. Systems and processes of discrete events. Terminology and architecture of a discrete event model. Application areas.
2. Flexsim 3D: bases.	Sources. Queues Processors Sinks. Practical case. Tags, decisions, popups. Practical case Libraries of standard objects I: Combiner. Separator. Multiprocessor. Rack. Conveyor. Practical case. Libraries of standard objects II: Task Executer. Operator. Transporter. Elevetor. Robot. Crane. ASRSvehicle. Practical case.
3. Analysis of input data for simulation and time measurement.	Practical case.
4. Simulation: experiments and analysis of results.	Practical case.
5. FlexSim: Tables, variables, connection with Excel.	Global tables. Labels Global variables. Monitoring variables. Connection with Excel. Modification of variables. Case study.
6. Advanced simulation techniques.	Introduction to Process Flow.
7. Optimization.	Linear programming. Non-Linear Programming Metaheuristics.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	B5 B7 B9	30	30	60
Problem solving	B5 B7 B9	10	20	30
ICT practicals	B5 B7 B9	20	38	58
Personalized attention		2	0	2
(*)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 about the course topics.
Problem solving	Solving simulation and optimization problems encountered in engineering.
ICT practicals	Resolution of practical cases of simulation and optimization problems.

Personalized attention	
Methodologies	Description
ICT practicals Guest lecture / keynote speech Problem solving	The personalized attention will be made in the tutorials.

Assessment			
Methodologies	Competencies	Description	Qualification
ICT practicals	B5 B7 B9	La evaluación se hará en base a los trabajos realizados en las clases prácticas en clase así como los trabajos individuales en casa. Todos ellos se subirán a la plataforma Moodle.	100

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 (2020). Tutoriales Flexsim. https://docs.flexsim.com/en/20.2/Introduction/Welcome/ - García del Valle, Alejandro; Crespo Pereira, Diego; Lamas Rodríguez, Adolfo (2020). Apuntes de Simulación y Optimización. UDC
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 TEAMS or 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.

(*)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.