		Teachin	g Guide		
	Identifyin	ng Data			2023/24
Subject (*)	Simulation and Optimization of Sh	nipbuilding Pro	cesses	Code	730542024
Study programme	Master Universitario Erasmus Mu	indus en Sostib	ilidade e Industria 4	0 aplicada ao Secto	r Marítimo
		Descr	iptors		
Cycle	Period	Ye	ar	Туре	Credits
Official Master's Degre	e 1st four-month period	Sec	ond	Optional	6
Language	English		-		
Teaching method	Face-to-face				
Prerequisites					
Department	Empresa				
Coordinador	Pernas Álvarez, Javier E-mail javier.pernas2@udc.es				
Lecturers	Lamas Rodriguez, Adolfo E-mail adolfo.lamasr@udc.es			udc.es	
	Pernas Álvarez, Javier javier.pernas2@udc.e			Qudc.es	
Web					
General description	The goal of this subject is to provi	ide a basic the	oretical and practical	understanding of me	odelling and simulation
	technologies (M&S) applied to shipbuilding. M&S is considered one of the Industry 4.0 technologies that allows ship				chnologies that allows shipyard
	to optimize manufacturing process	ses and logistic	cs. The simulation so	oftware Flexsim will b	e used to solve practical cases
	based on real problems solved in shipyards.				

	Study programme competences			
Code	Study programme competences			
B7	CG1 ? To display the adequate intercultural competence to successfully navigating within multicultural learning environments and to			
	implement basic management principles suitable for a multicultural working environment.			
B8	CG2 ? To express an attitude of intellectual inquisitiveness and open-mindedness.			
B11	CG5 ? To have the capability to identify, formulate and solve engineering problems within realistic constraints.			
B13	CG7 ? To have the capability to critically analyse, synthesise, interpret and summarise complex scientific processes.			
C2	CT2 - Mastering oral and written expression in a foreign language.			
C3	CT3 - Using ICT in working contexts and lifelong learning.			
C4	CT4 - Acting as a respectful citizen according to democratic cultures and human rights and with a gender perspective.			
C6	CT6 - Acquiring skills for healthy lifestyles, and healthy habits and routines.			
C7	CT7 -Developing the ability to work in interdisciplinary or transdisciplinary teams in order to offer proposals that can contribute to a			
	sustainable environmental, economic, political and social development.			

Learning outcomes			
Learning outcomes	Study p	orogra	mme
	comp	petenc	es
Knowledge of the methods and strategies applied to shipbuilding.	E	BC6	CC2
	E	BC7	CC3
	В	3C10	CC4
	В	3C12	CC6
			CC7
Capacity to understand and to implement simulation and optimization of shipbuilding processes.	E	BC6	CC2
	E	BC7	CC3
	В	3C10	CC4
	В	3C12	CC6
			CC7

Contents		
Topic	Sub-topic	

Modelling and Simulation	The M&S methodology. M&S technologies. Simulation projects.	
Model development in Flexsim	Flexsim basics. Fixed resource library. Task executers. Networks and conveyors.	
	Introduction to process flows.	
Shipbuilding processes	Cutting-welding. Block assembly. Outfitting. Painting. Blocks erection.	
Shipyard simulation.	Material receipts. Assembly workstations. Blocks erection. Cranes. Planning.	
Optimization	Input data analysis. Simulation experiments. Optimization concepts. Linear models.	
	Heuristics. Evolutionary algorithms.	

	Planning			
Methodologies / tests	Competencies	Ordinary class	Student?s personal	Total hours
		hours	work hours	
ICT practicals	A2 A3 B7 B8 B11 B13	15	15	30
	C2 C3 C4 C6 C7			
Case study	B7 B8 B11 B13 C2	4.5	22.5	27
	C3 C4 C6 C7			
Supervised projects	A2 A3 B7 B8 B11 B13	1.5	40.5	42
	C2 C3 C4 C6 C7			
Mixed objective/subjective test	B7 B8 B11 B13 C2	2	2	4
	C3 C4 C6 C7			
Guest lecture / keynote speech	A2 A3 B8 B11 B13	21	21	42
Personalized attention		5	0	5

Methodologies			
Methodologies	Description		
ICT practicals	Solving practical problems and case studies using Flexsim.		
Case study	Solving practical cases proposed by the teachers		
Supervised projects	Simulation project proposed by the teachers		
Mixed	Final exam about the contents of this subject.		
objective/subjective			
test			
Guest lecture /	Lectures on the subject contents		
keynote speech			

Personalized attention			
Methodologies	Description		
ICT practicals	During tutorial time, students can meet the teachers to clarify the doubts of the subject, as well as the ones concerning the		
Mixed	supervised projects		
objective/subjective			
test			
Guest lecture /			
keynote speech			
Case study			
Supervised projects			

		Assessment	
Methodologies	Competencies	Description	Qualification
Mixed	B7 B8 B11 B13 C2	Assessment of the final exam	20
objective/subjective	C3 C4 C6 C7		
test			

Case study	B7 B8 B11 B13 C2	Assessment of the practical cases assigned to the students.	20
	C3 C4 C6 C7		
Supervised projects	A2 A3 B7 B8 B11 B13	Assessment of the supervised project assigned to the students.	60
	C2 C3 C4 C6 C7		

Assessment comments

Assessment criteria

Second opportunity

The assessment criteria for the first and the second opportunity are the same.

'No Presentado' grade

The grade of "No presentado" (no grade) will be given to those students who will not hand in the supervised project.

Additional information

According to Article 11, section 4 b) of the "Reglamento disciplinar del estudiantado de la UDC", engaging in fraudulent behavior in any of the methodologies subject to assessment sections will result in a grade of "Fail (0)" for the final evaluation, both in the first and second opportunity, regardless of the opportunity in which the offense was committed.

General 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.

	Sources of information
Basic	- Robinson, Stewart (2004). Simulation : The Practice of Model Development and Use. John Wiley & Development and Use.
	- Flexsim (2022). Flexsim Tutorials.
	- Banks, Jerry Carson, Jhon S. Nelson, Barry L. Nicol, David M. (2010). Discrete-Event System Simulation. Prentice
	Hall
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



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. In this course, an effort will be pursued towards the incorporation of gender inclusion aspects: no sexist language will be allowed, bibliography from authors of both genders will be used, and the participation of students of both gender in class will be promoted. The situations of gender discrimination will be detected, and actions will be implemented to correct them. The full integration of students who for physical, sensorial, psychic, or socio-cultural reasons may have difficulties in their academic life will be promoted.

(*)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.