Teaching Guide				
Identifying Data				2020/21
Subject (*)	Energy Use of Regasification of Liquefied Natural Gas		Code	770523017
Study programme	Mestrado Universitario en Eficiencia e Aproveitamento Enerxético			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	3
Language	SpanishGalicianEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Ciencias da Navegación e Enxeñaría MariñaEnxeñaría Naval e Industrial			
Coordinador	Romero Gómez, Manuel	E-mail	m.romero.gomez@udc.es	
Lecturers	Romero Gómez, Manuel	E-mail	m.romero.gomez@udc.es	
Web	moodle.udc.es/			
General description	Natural gas is the fossil fuel with less environmental impact. It is the fuel of the present and the future to help reduce emissions. The natural gas passes through various processes from extraction to final consumption by users. One of these processes is the storage and regasification of LNG. In this subjet the regasification process is studied from the thermodynamic point of view to establish strategies to exploiting the energy released in this process. Software tools to optimize the process are used.			
Contingency plan	1. Modifications to the contents No changes will be made 2. Methodologies *Teaching methodologies that are maintained Problem solving, Supervised projects, Objective test and Guest lecture (by teams). *Teaching methodologies that are modified 3. Mechanisms for personalized attention to students e-mail, telephone, moodle and teams 4. Modifications in the evaluation The same evaluation methodologies and percentages are maintained. *Evaluation observations: 5. Modifications to the bibliography or webgraphy No changes are made. It will be available in moodle.			

Study programme competences / results	
Code	Study programme competences / results
A13	Capacidad para analizar, aplicar y optimizar los sistemas de aprovechamiento energético.
B1	Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio.
B3	Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación.
B6	Buscar y seleccionar alternativas considerando las mejores soluciones posibles.
B7	Desarrollar las capacidades de análisis y síntesis; fomentar la discusión crítica, la defensa de argumentos y la toma de conclusiones.
B9	Extraer, interpretar y procesar información, procedente de diferentes fuentes, para su empleo en el estudio y análisis.
B11	Adquirir nuevos conocimientos y capacidades relacionados con el ámbito profesional del máster.
B13	Aplicar los conocimientos teóricos a la práctica

B14	Aplicar conocimientos de ciencias y tecnologías avanzadas a la práctica profesional o investigadora de la eficiencia
B16	Valorar la aplicación de tecnologías emergentes en el ámbito de la energía y el medio ambiente.
B18	Plantear y resolver problemas, interpretar un conjunto de datos y analizar los resultados obtenidos; en el ámbito de la eficiencia energética y la sostenibilidad.
C2	Fomentar la sensibilidad hacia temas medioambientales.
C3	Aplicar una metodología que fomente el aprendizaje y el trabajo autónomo.

Learning outcomes			
Learning outcomes	Study programme competences / results		
Ability to analyze, implement and optimize energy utilization systems.	AJ13		
That the students can apply their knowledge and their ability to solve problems in new or unknown environments within broader (or multidisciplinary) contexts related to their field of study.		BC1	
Knowledge and understanding that provides a basis or opportunity to be original in the development and / or implementation of ideas.		BC3	
Find and select the best alternative considering possible solutions.		BC6	
Develop the capacities of analysis and synthesis; encourage critical discussion, arguments and making conclusions.		BC7	
Extract, interpret and process information from different sources, for use in the study and analysis.		BC9	
Acquire new knowledge and skills related to the professional field of the master.		BC11	
Apply theoretical knowledge into practice		BC13	
Apply knowledge of science and advanced technologies to professional practice or research efficiency		BC14	
Assess the application of emerging technologies in the field of energy and the environment.		BC16	
Solve problems, interpret a set of data and analyze the results obtained; in the field of energy efficiency and sustainability.		BC18	
Foster sensitivity to environmental issues.			CC2
Apply a methodology that fosters learning and self-employment.			CC3

Contents	
Topic	Sub-topic
1. Introduction to natural gas	1.1 Chain of natural gas 1.2 Uses of natural gas 1.3 Iberian and European gas network
2. Onshore regasification terminals	2.1 Equipment 2.2 LNG regasification process 2.3 regasification terminals: Features
3. Offshore regasification terminals	3.1 Vessels FSRU (Floating Storage and Regasifcation Unit) 3.2 Description of operation 3.3 Equipment
4. Energetic and exergetic analysis LNG regasification process	4.1 Thermodynamic Fundamentals 4.2 Energy and Exergy Analysis 4.3 Recovery of LNG exergy regasification process 4.4 Analysis of power plants with utilization of LNG exergy. 4.5 Case study to solve with the software EES (Engineering Equation Solver).

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

Problem solving	A13 B1 B6 B13 B14 C3	7	14	21
Supervised projects	A13 B1 B6 B7 B9 B13	8	8	16
Objective test	B1 B6 B7 B9 B13 B14 B16	2	6	8
Guest lecture / keynote speech	B3 B7 B9 B11 B16 B18 C2	15	15	30
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**
Problem solving	Collections of exercises proposed for each issue will be resolved, allowing the application of the most appropriate mathematical models to each case, including management software, application of the most appropriate assumptions, regarding the theoretical contents developed in lectures and relationship with the professional exercise.
Supervised projects	Troubleshooting greater demands that the exercises solved in class or issues of particular relevance.
Objective test	The degree of acquired knowledge on the subject in question is valued, taking into account both the theoretical part as problems.
Guest lecture / keynote speech	The detailed explanation of the contents of the subject will be made. The student will have a copy of the topic in each session master. Class participation is encouraged through comments linking the theoretical content with real-life experiences.

Personalized attention	
Methodologies	**Description**
Supervised projects Problem solving	The student is guided on those issues that are imparted and special difficulty understanding matter. Channels and contact information will be the Virtual Faculty and individualized tutoring that develop during the week.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Supervised projects	A13 B1 B6 B7 B9 B13	Presentation and defense of the work performed. The structure, neatness, content and originality expository will be evaluated.	10
Guest lecture / keynote speech	B3 B7 B9 B11 B16 B18 C2	Attendance at the sessions will be counted in the final mark.	10
Problem solving	A13 B1 B6 B13 B14 C3	Troubleshooting, if possible, with appropriate software	10
Objective test	B1 B6 B7 B9 B13 B14 B16	Assessment of Knowledge and understanding of the basic contents of the subject, considering the student's abilities and skills, strategies and approaches to problem solving. The degree of development of students and their ability to analyze and solve specific problems will be evaluated, requiring a balanced theoretical and practical training.	70

Assessment comments
A final exam for those students who do not participate in the continuous assessment of the subject throughout the course will be proposed. It allows to evaluate and verify the expected results in terms of global content of matter and verify the degree of achievement of the objectives. The overall final exam will consist of a test composed of 2 parts: a) theoretical (50%); b) practice (50%); with independent valuation, which is necessary to obtain a minimum of 3 points in each part purposed.

Sources of information	
Basic	- Saeid Mokhatab, John Y. Mark (). Handbook of Liquefied Natural Gas. Elsevier - Michael J. Moran, Howard N. Shapiro (). Fundamentos de Termodinámica Técnica. Reverté - Saeid Mokhatab, William A. Poe and James G. Speight (). Handbook of Natural Gas Transmission and Processing. Elsevier
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

(*)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.