UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2022/23
Subject (*)	Energy Storing Systems		Code	730547018d
Study programme	Máster Universitario en Eficiencia Enerxética e Sustentabilidade (a distancia)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	3
Language	SpanishGalician			
Teaching method	Non-attendance			
Prerequisites				
Department	Enxeñaría Industrial			
Coordinador	Casteleiro Roca, José Luis	E-mail	jose.luis.casteleiro@udc.es	
Lecturers	Casteleiro Roca, José Luis	E-mail	jose.luis.casteleiro@udc.es	
Web				
General description	This subject aims to give the student the theoretical knowledge of the various types and functions of the Energy Storage systems used today.			

Study programme competences / results	
Code	Study programme competences / results
A13	CE13 - Analyze, apply and optimize energy use systems
B1	CB6 - Possess and understand knowledge that provides a foundation or opportunity to be original in the development and/or application of ideas, often in a research context
B4	CB9 - That students know how to communicate their conclusions and the knowledge and ultimate reasons that support them to specialized and non-specialized audiences in a clear and unambiguous way
B6	CG1 - Search and select alternatives considering the best possible solutions
B10	CG5 - Boost creativity
B13	CG8 - Apply theoretical knowledge to practice
C1	CT1 - Express themselves correctly, both orally and in writing, in the official languages of the autonomous community
C3	CT3 - Use the basic tools of information and communication technologies (ICT) necessary for the exercise of their profession and for learning throughout their lives
C5	CT5 - Understand the importance of entrepreneurial culture and know the means available to entrepreneurs

Learning outcomes			
Learning outcomes	Study programme competences / results		
Learn about potential energy storage systems	AC13	BC1 BC13	CC1 CC3
Know the kinetic energy storage systems	AC13	BC6 BC13	CC3 CC5
Know the electrical and magnetic energy storage systems	AC13	BC4 BC6	CC3
Learn about chemical energy storage systems	AC13	BC1 BC10	CC5
Learn about storage systems with compressed air	AC13	BC4 BC10	CC1

Contents	
Topic	Sub-topic

Contents described in the verification report	Need for energy storage. Potential energy storage. Kinetic energy storage. Storage of electrical and magnetic energy. Chemical energy storage. Energy storage with compressed air.
Topic 1: Need for energy storage	1.1. The binomial generation-consumption 1.2. Problems of load variation in the power stations
Topic 2: Potential energy storage	2.1. Operating principle 2.2. Storage reservoirs. Pump stations
Topic 3: Kinetic energy storage	3.1. Operating principle 3.2. Inertial storage disks
Topic 4: Energy storage with engines	4.1. Operating principle 4.2. Compressed air
Topic 5: Electrical energy storage	5.1. Operation principle of a battery 5.2. Operation principle of a fuel cell (Hydrogen)

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Workshop	B1 B6 B10	4	25	29
Workbook	A13 B6 B13	9	10	19
Mixed objective/subjective test	B4 B6 C1	2	0	2
Laboratory practice	B4 B10 C3 C5	9	15	24
Personalized attention		1	0	1
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Workshop	Realization of an individual work of a specific subject of the subject and sharing in a group to share knowledge. Later the works will be joined in a common one that will be presented in class by groups.
Workbook	Keynote speech complemented with the use of audiovisual media and the introduction of some questions to students, in order to transmit knowledge and facilitate learning. The order of the topics covered will not have to be the one described in the teaching guide. In addition, there will be topics that can be seen together on the development of others, and the division between them may not be strict.
Mixed objective/subjective test	It consists in carrying out an objective test of approximately 3 hours, in which the acquired knowledge will be evaluated.
Laboratory practice	Performing laboratory practice as far as possible; or, failing that, solving exercises and specific problems in the classroom, from the knowledge explained.

Personalized attention	
Methodologies	Description
Workshop	The student has the relevant meetings of personalized tutorials, to resolve the concerns arising from the matter.

Assessment

Methodologies	Competencies / Results	Description	Qualification
Laboratory practice	B4 B10 C3 C5	Some tasks established in the subject, within the framework of this methodology	10
Workshop	B1 B6 B10	Accomplishment of an individual and group work, as well as its exhibition in class	30
Mixed objective/subjective test	B4 B6 C1	Exam type objective test	60

Assessment comments
As part of the "Laboratory practice" may include aspects such as attendance, personal work, attitude, etc., to help to pass the subject. The "Mixed test" will be divided into a multiple choice and some questions. It is necessary to exceed 15% of the score in the "Mixed test" to pass, as well as to approve the works proposed in "Workshop". Students with recognition of part-time dedication and academic waiver of attendance exemption, second establishes the "NORMA QUE REGULA O RÉXIME DE DEDICACIÓN AO ESTUDO DOS ESTUDANTES DE GRAO NA UDC (Arts. 2.3; 3.b e 4.5) (29/5/212)", will be evaluated in the same way, allowing one more week of margin in the assignments. For the second opportunity, there will be no second deadline for assignments, and the evaluation will be done in a similar way to the first opportunity. The evaluation criteria of the early December call will be the same as those of the second opportunity of the previous year.

Sources of information	
Basic	
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 achieve an immediate sustainable environment and meet the objective of action number 5: "Healthy and sustainable environmental and social teaching and research" of the "Green Campus Ferrol Action Plan":1. The delivery of the documentary works that are made in this matter: 1.1. They will be requested in virtual format and / or computer support   1.2. They will be made through Moodle, in digital format without the need to print them

(*)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.