



## 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

