COURSE NAME

Name: **RENOVABLE ENERGY: STORAGE SYSTEMS**
Code: 101216
Curriculum: **DEGREE IN ENERGY ENGINEERING AND MINERAL RESOURCES** Year: 4
Subject: **RENOVABLE ENERGY: STORAGE SYSTEMS**
Nature: OBRIGATORY Duration: FIRST SEMESTER
ECTS Credits: 4.5 Classroom hours: 45
Face-to-face classroom percentage: 40% Non-contact hours: 68

FACULTY DETAILS

Name: ORTIZ JIMENEZ, GREGORIO FCO (Coordinator)
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Name: SOLER PIÑA, FRANCISCO JAVIER
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SKILLS

CB1	Have and understand specific knowledge of the field of study of mining engineering.
CB2	Have and understand current and cutting-edge knowledge of the field of mining engineering.
CB3	Be able to apply the knowledge acquired in professional contexts and to elaborate and defend arguments in the field of knowledge of mining engineering.
CU2	Know and refine the user level of ITs.
CERE8	Alternative energies and efficient use of energy.
CERE10	Quality control of the materials used.

OBJECTIVES

This course is aimed at students in the 4th year of the Energy and Mining Resources Engineering degree. The first goal of this course is to introduce the student to the importance of understanding the basic concepts related to energy storage systems. The second objective is to make the student aware of the different types of energy storage possible. From primary to secondary systems. In addition, it is intended to give students an overview of the scientific advances that are being made in energy storage systems, as well as teach them about alternatives to classical systems. New strategies for the design of nanomaterials will also be presented. Finally, students will put into practice their knowledge of rechargeable batteries (such as lithium-ion batteries).

CONTENTS:

1. Theoretical contents

1.- Energy storage. Classification.
2.- Biomass. Introduction.
3.- Hydrogen economy.
4.- Electrochemical systems (I). Supercapacitors.
5- Electrochemical systems (II). Electrochemical concepts.
6- Electrochemical systems (III). Lithium-ion batteries.
7- Design of Nanostructured Materials for Renewable Energy Storage (LIB and NIB)
Theory ANNEXES
Annex 1: Environmental considerations of batteries. Chemical composition. Toxic effects of heavy metals. Collecting and recycling batteries.
Annex 2: Future perspectives on batteries. Lithium-sulphur batteries; Lithium-air batteries; Na-ion batteries

2. Practical contents.

There will be sessions related to the theoretical content, including seminar sessions, debates and lab work. These are structured as follows:

Session 1: Biodiesel synthesis (2h)
Session 2: Solar pond (2h)
Session 3: Hydrogen: Procurement and applications (2h)
Session 4: Galvanic Cells (4h)
Seminar 1: Hydrogen (4h)
Seminar 2: Batteries (2h)