

Academic Year/course: 2022/23

66379 - Chemical and electrical storage

Syllabus Information

Academic Year: 2022/23

Subject: 66379 - Chemical and electrical storage

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 636 - Master's in Renewable Energies and Energy Efficiency

ECTS: 3.0

Year: 1

Semester: Second semester

Subject Type: Optional

Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology in this course includes the following teaching and learning tasks:

- Lectures. Together with the theoretical issues, different problems will be proposed and solved in class for each topic. Students will work on them, analyzing the most important and representative topics. In some cases, a group discussion could be suggested.
- Case studies and monographic work from scientific papers or institutions and companies reports. Analysis and conclusions. The student could work individually or in small groups. Some of these works could be written down and handed to the lecturer for their assessment and marked for being included in the final grade following the rating scale specified in the corresponding section.

4.2. Learning tasks

The course offered to the student in order to attain the objectives includes the following learning tasks:

A01 Lectures (exposition of the different topics by the lecturer or by experts to all the students of the course) (15h).

A02 Problem and case solving (practical exercises with all the students of the course) (12h).

A05 Guided applied or practical research projects (12h)

A07 Autonomous work and study by the student (30 h).

A08 Assessment tests (3h).

Times allocated to each task are indicative and will be adjusted according to the academic schedule of the course.

Information about the practical sessions schedule will be provided at the beginning of the course, according to the development of the syllabus and laboratory and computer classroom availability.

4.3. Syllabus

The contents addressed in this course are as follows:

1. Interchangeability of energy sources. Energy hybridization. Energy storage advantages. Potential uses. Storage types.
2. Reversible hydroelectric storage. Operation principles.
3. Chemical storage. Power-to-X. Hydrogen. Ammonia. Methanol. Synthetic natural gas.
4. Electrochemical storage. Physicochemical fundamental. Reactions. Battery types. Structure. Characteristics. Performance parameters. Applications. Technology comparison. Future developments. Integration in energy systems.
5. Other storage systems: supercapacitors, flywheels, electromagnetic storage.

4.4. Course planning and calendar

This is a optional course of 3 ECTS credits, that equals 75 h of student work. Learning activities are described in section 4.2. Detailed information about the planning of the learning activities, assessment dates and final exam date will be provided by the lecturers on the first day of class.

The specific schedule of the activities and the corresponding classroom or spaces is responsibility of Escuela de Ingeniería y Arquitectura (EINA) and they can be found on <http://eina.unizar.es>. Each lecturer will inform about office hours and any modification that could take place during the course.