Universidad Zaragoza

Academic Year/course: 2023/24

30053 - Electric Mobility

Syllabus Information

Academic year: 2023/24
Subject: 30053 - Electric Mobility
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 436 - Bachelor's Degree in Industrial Engineering Technology
ECTS: 6.0
Year: 4
Semester: First semester
Subject type: Optional
Module:

1. General information

The main objective of the subject is for the student to learn about the different degrees of electrification of the electric vehicles: semi-hybrid, HEV, PHEV, FCEV and BEV. The technologies necessary for its development, such as electric motors, batteries and power electronics. The charging methods conductive and inductive and the relationship with the smart grid are also studied.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (https://www.un.org/sustainabledevelopment/es/), in particular, the learning activities foreseen in this subject will contribute to the achievement of Objective 3.9 of Goal 3; 7.2 of Goal 7; 8.2 of Goal 8, Objective 9.1 of Goal 9; 12.2 of Goal 12 and 13.3 of Goal 13.

2. Learning results

- To understand the needs that force the change from combustion vehicles to electric vehicles To know the topology of pure electric and hybrid electric vehicles.
- Calculation of the energy needs of an EV
- Understanding EV and PHEV charging procedures
- To learn about energy storage technologies in EVs and PHEVs
- To analyse electric traction systems in EVs
- To study the power converters required in EVs
- To know the necessary infrastructures for EV power supply
- To identify the network impact of EV charging and how to solve it
- To link electric mobility and the Smartgrid
- To model an electric vehicle with Matlab-Simulink, calculate its power, torque, energy requirements. To dimension the battery pack

3. Syllabus

- Introduction: electric vehicle and Smartgrid
- The need for electric mobility: consumption of fossil fuels, environmental and health impact.
- Brief history of electric mobility
- Types of low emission vehicles and their technologies: micro-hybrid, semi-hybrid, HEV, PHEV, FCEV
- Pure electric vehicle. Advantages and disadvantages. Comparison of consumption and contaminant emissions.
- ELV technologies: motors, batteries, power electronics
- Electric vehicle charging: types, regulations and standards
- Impact of electric mobility on the power system, transmission grid and distribution network.
- Importance of electric vehicles for the smartgrid.

4. Academic activities

Master class (presentation of contents by the teaching staff or external experts to all the students of the subject): 25 hours

Problem solving and case studies (practical exercises with all the students of the subject). 20h Laboratory practices (carrying out practical exercises in small groups of students of the subject) 15h Practical application or research work.30h

Personalized tutoring teacher-student, face-to-face, email or online. 10 h

Self-study by the student. 45 h

Assessment tests. 5h

5. Assessment system

The evaluation is mixed: work done by the student throughout the subject, practices and a theoretical test type test, short questions and problems, at the end of the subject.

The theoretical test has a weight of 50%; the assignments, which are assigned throughout the term, presented publicly, 30%; the practices, which are obligatory, 20%, and which will end with the delivery of a completed script.

And in accordance with the regulations of the University of Zaragoza in this regard, in the subjects that have continuous or gradual assessment systems , a global assessment test will also be scheduled for those students who decide to opt for this second system. The second call for assessment will be carried out by means of a global test carried out in the period established for this purpose in the academic calendar.