

## 29640 - Electric Mobility

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 29640 - Electric Mobility

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 430 - Bachelor's Degree in Electrical Engineering

**ECTS:** 6.0

**Year:** 4

**Semester:** First 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 followed in this course is oriented towards the achievement of the learning objectives. It is structured around four axes: the theory sessions, the resolution of problems and cases, the practical sessions and the completion of four autonomous works.

In the theory sessions (master classes) the basic concepts are explained and related to the technical characteristics of the systems, combining them with the problem-solving sessions and examples solved in class.

In practical sessions, a computer program is used to model an electric vehicle: dynamic behavior, energy consumption, battery, motor, electronics and its control. There is also a session in the Electric vehicle charging and electrical grid impact research laboratory.

In addition, students do four subject works, throughout the course, to deepen their knowledge of various topics.

Students are expected to actively participate in class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials, including a discussion forum.

More information about the course will be provided on the first day of class.

#### 4.2. Learning tasks

The program offered to the student to help him achieve the expected results includes the following activities:

A01. Lecturers (exposure of content by the teaching staff or external experts to all the students of the subject): 25h.

A02. Resolution of problems and cases (realization of practical exercises with all the students of the subject). 20h.

A03. Lab sessions (realization of practical exercises in small groups of students of the subject) 15h

A05 Practical application or research work. 30 h.

A06 Personalized tutoring teacher-student, face-to-face, email or online. 10 h.

A07 Autonomous study by the student. 45 h.

A08 Evaluation tests. 5h

### 4.3. Syllabus

The proposed syllabus for this course is as follows

- ? Introduction: electric vehicle and Smartgrid
- ? Need for electric mobility: environmental and health impact
- ? Brief history of electric mobility
- ? Types of low-emission vehicles and their technologies: micro-hybrids, hybrids, plug-in hybrids, hydrogen vehicles
- ? Electric vehicle. Advantages and disadvantages. Comparison of consumption and polluting emissions.
- ? Electric vehicle technologies: motors, batteries, power electronics
- ? Electric vehicle charging: types, regulations and standards
- ? Impact of electric mobility on the electrical power system, transport and distribution network
- ? Smartgrid and electric vehicle

In addition, the modeling of an electric vehicle with Matlab-Simulink will be developed.

### 4.4. Course planning and calendar

Calendar of class sessions and presentation of papers

The lectures and problems and practice sessions in the laboratory (or online) are taught according to the schedule established by the center and is published prior to the start date of the course (eina.unizar.es).

Each teacher will report their tutoring attention schedule.

The rest of the activities will be planned according to the number of students and will be announced well in advance.

The detailed calendar of the different activities will be established once the University has approved the academic calendar (which can be consulted on the center's website).

The list of activities and their date, together with all kinds of information and documentation, will be published in the subject's web space (Note: to access this website the student must be enrolled).

### 4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=29640&Identificador=15366>