240AU025 - Electric Systems in the Automobile

Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering
Academic year: 2019
Degree: MASTER'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2012). (Teaching unit Compulsory)
MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Teaching unit Optional)
ECTS credits: 3
Teaching languages: Spanish

Teaching staff
Coordinator: Daniel Montesinos i Miracle

Prior skills
It is recommendable to have some basic knowledge in electricity

Requirements
There are no previous requirements

Degree competences to which the subject contributes

General:
1. Adapt to changes, being able to apply new and advanced technologies and other relevant processes, initiative and entrepreneurship
2. Ability to apply appropriate knowledge of mathematical aspects, analytical, scientific, instrumental, technological and management, the resolution of the problems of the automotive
3. Integrate knowledge and handle complexity, making judgments and decisions, from incomplete or limited information, including reflections on the social and ethical responsibilities of professional practice

Teaching methodology
The course is mainly descriptive, therefore, it is based on class presentations with the support of slides

Learning objectives of the subject
The aim of the subject is to provide the students of the minimum knowledge about electricity within the automobile

Study load

<table>
<thead>
<tr>
<th>Total learning time: 75h</th>
<th>Hours large group: 18h</th>
<th>24.00%</th>
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<tbody>
<tr>
<td></td>
<td>Hours small group: 9h</td>
<td>12.00%</td>
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<tr>
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<td>Self study: 48h</td>
<td>64.00%</td>
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# Introduction

**Learning time:** 4h  
**Theory classes:** 4h

**Description:**  
Introduction to the main blocks of a vehicle's electric system

**Related activities:**  
Session where SEAT will present the design process of a vehicle

**Specific objectives:**  
Introduce the student to the importance of electricity within a vehicle and give a global vision of all the generation, accumulation, transport and consumption system. Identify the main elements.

## Basic concepts in electricity, electrical machines, power electronics and the electric and electronic components

**Learning time:** 8h  
**Theory classes:** 8h

**Description:**  
Review of the basic concepts of electricity, electrical machines, power electronics and the electrical and electronic components needed to a good understanding of the following lessons

**Specific objectives:**  
Provide the student of the basic tools to understand the electrical system of a vehicle

## Energy generation and storage

**Learning time:** 6h  
**Theory classes:** 6h

**Description:**  
Describe the main energy storage technologies in a vehicle, and the generation process of this energy

**Specific objectives:**  
Describe the different types of batteries and the ways of energy generation in a vehicle

## Wiring and connectors

**Learning time:** 2h  
**Theory classes:** 2h

**Description:**  
Wiring and connectors in a vehicle are key parts to ensure at any moment that the electrical energy gets to where it must get with the needed quality

**Specific objectives:**  
Provide the student of the abilities to measure an electrical distribution of energy in a vehicle
Partial exam (Nep) plus a final exam (Nef) of the concepts learned in class.

\[ \text{Nf} = 0.3^* \text{Nep} + 0.7^* \text{Nef}. \]

If \( \text{Nef} > \text{Nf} \), the final mark will be \( \text{Nf} = \text{Nef} \).

**Qualification system**

**Regulations for carrying out activities**

No notes can be used in the exam

**Bibliography**

**Basic:**


