Course guide
220119 - APV - Alternative Propulsion Vehicles

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering.
Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).
Academic year: 2022  ECTS Credits: 3.0  Languages: English

LECTURER

Coordinating lecturer: JUAN MONTAÑA PUIG
Others: DAVID GONZALEZ DIEZ

TEACHING METHODOLOGY

Theory classes: In these lectures, teachers will introduce basic concepts of energy storage systems, hybrid architectures, electric motors and drives and system modeling. All these explanations are practically oriented and they will be illustrated with real examples to facilitate their understanding.
Practical classes: In these lectures, that are concentrated in modules 3 and 4, students will practice the concepts introduced in previous modules.
Self-study: Students, organized in teamworks, need to work on the materials provided by teachers in order to develop the assigned homework.
Teachers provide the curriculum and monitoring of activities through ATENEA

LEARNING OBJECTIVES OF THE SUBJECT

This course gives an overview of state of the art on cars alternative propulsion systems. It covers a description of components, system architectures and operation. The course also considers the modeling and simulation of these systems and at the end of the course, students should be able:
- to know the basics principles, components and operation of alternative propulsion systems
- to model and simulate the performance of these systems

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>40.00</td>
</tr>
<tr>
<td>Self study</td>
<td>45,0</td>
<td>60.00</td>
</tr>
</tbody>
</table>

Total learning time: 75 h
## CONTENTS

### Module 1: Introduction to Alternative Propulsion Vehicles

**Description:**
This introduces basics on alternative propulsion vehicles. It is mainly focused on pure electric and hybrid (petrol-electric) vehicles. System architectures. Energy Accumulators State of the art of current technologies is presented as future trends as well

**Related activities:**
Final exam

**Full-or-part-time:** 12h 30m  
Theory classes: 5h  
Self study : 7h 30m

### Module 2: Principles of Electric Drives

**Related activities:**
Final exam

**Full-or-part-time:** 12h 30m  
Theory classes: 5h  
Self study : 7h 30m

### Module 3: Laboratory of Electric Machines and Drives

**Description:**
This module is devoted to practice implementation of electric drives Motor drives. Electric braking

**Related activities:**
Homework related to Module 3  
Final exam

**Full-or-part-time:** 25h  
Theory classes: 10h  
Self study : 15h

### Module 4: Modeling & Simulation

**Description:**
This module is devoted to the modeling and simulation of pure electric/hybrid vehicles using Matlab/Simulink. The model is useful for system sizing and design and to predict the vehicle performance.

**Related activities:**
Final exam.

**Full-or-part-time:** 25h  
Theory classes: 10h  
Self study : 15h
GRADING SYSTEM

The final grade depends on the following assessment criteria:

- Laboratory work related to Module 3: 30 %
- Assignments related to Module 4: 30 %
- Final exam: 40 %

Unsatisfying results of the Final exam could be repeated in an exam to be allocated during the period of the final exams. Students with grades lower than 5 points (unsatisfactory) can retake the exam. The new grade, if it is equal or higher than 5 points, will substitute with the Final exam grade with 5 points.

BIBLIOGRAPHY

Basic:

Complementary: