220119 - Alternative Propulsion Vehicles

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 709 - EE - Department of Electrical Engineering
Academic year: 2017
Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Optional)
BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Teaching unit Optional)
BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Optional)
ECTS credits: 3

Teaching languages: English

Teaching staff
Coordinator: JUAN MONTAÑA PUIG
Others: DAVID GONZALEZ DIEZ

Degree competences to which the subject contributes

Specific:
1. An understanding of, and skills for, the modelling and simulation of systems
2. An understanding of and the ability to use the principles of circuit theory and electrical machines.
3. An understanding of the basics of electronics
4. Applied knowledge of power electronics.
5. The ability to calculate and design electrical machines

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
220119 - Alternative Propulsion Vehicles

### Study load

<table>
<thead>
<tr>
<th>Total learning time: 75h</th>
<th>Hours large group:</th>
<th>30h</th>
<th>40.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study:</td>
<td>45h</td>
<td></td>
<td>60.00%</td>
</tr>
</tbody>
</table>

Last update: 16-05-2017
# 220119 - Alternative Propulsion Vehicles

## Content

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
<th>Learning time</th>
<th>Related activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module 1: Introduction to Alternative Propulsion Vehicles</strong>&lt;br&gt;<strong>Description:</strong>&lt;br&gt;This introduces basics on alternative propulsion vehicles. It is mainly focused on pure electric and hybrid (petrol-electric) vehicles.&lt;br&gt;System architectures. Energy Accumulators&lt;br&gt;State of the art of current technologies is presented as future trends as well</td>
<td><strong>Learning time:</strong> 12h 30m&lt;br&gt;Theory classes: 5h&lt;br&gt;Self study: 7h 30m</td>
<td>Final exam</td>
<td></td>
</tr>
<tr>
<td><strong>Module 2: Principles of Electric Drives</strong>&lt;br&gt;<strong>Related activities:</strong>&lt;br&gt;Final exam</td>
<td><strong>Learning time:</strong> 12h 30m&lt;br&gt;Theory classes: 5h&lt;br&gt;Self study: 7h 30m</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Module 3: Laboratory of Electric Machines and Drives</strong>&lt;br&gt;<strong>Description:</strong>&lt;br&gt;This module is devoted to practice implementation of electric drives&lt;br&gt;Motor drives. Electric braking</td>
<td><strong>Learning time:</strong> 25h&lt;br&gt;Theory classes: 10h&lt;br&gt;Self study: 15h</td>
<td>Homework related to Module 3&lt;br&gt;Final exam</td>
<td></td>
</tr>
<tr>
<td><strong>Module 4: Modeling &amp; Simulation</strong>&lt;br&gt;<strong>Description:</strong>&lt;br&gt;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.</td>
<td><strong>Learning time:</strong> 25h&lt;br&gt;Theory classes: 10h&lt;br&gt;Self study: 15h</td>
<td>Final exam</td>
<td></td>
</tr>
</tbody>
</table>
The final grade depends on the following assessment criteria:

- Homework related to Module 3, weight: 30 %
- Homework related to Module 4, weight: 30 %
- Final exam, weight: 40 %

**Bibliography**

**Basic:**


**Complementary:**


**Others resources:**