Course guide
340604 - SEAI-R1O10 - Advanced Electronic Systems and Integration of Electrical Energy Sources

Unit in charge: Vilanova i la Geltrú School of Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.
Degree: MASTER'S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012). (Compulsory subject).

Academic year: 2023   ECTS Credits: 5.0   Languages: Spanish

LECTURER

Coordinating lecturer: José Luis García de Vicuña
Others: José Luis García de Vicuña
Miguel Castilla Fernández

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. CC07 - Apply power electronic systems and power blocks. Identify energy management systems.

TEACHING METHODOLOGY

Model of problem based learning (PBL)

LEARNING OBJECTIVES OF THE SUBJECT

The course is oriented to the study of power electronics systems, the analysis and design of power electronics systems, and the description of the main industrial applications. The objectives include: 1) to know the main of power electronics systems, 2) modeling, control and simulation the different kind of power electronics systems, 3) Modeling, Analysis, and Control of Electric Power Converters for Power System Applications

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>22,5</td>
<td>18.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>22,5</td>
<td>18.00</td>
</tr>
<tr>
<td>Self study</td>
<td>80,0</td>
<td>64.00</td>
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</tbody>
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Total learning time: 125 h
## CONTENTS

### Modeling Power Electronics Systems

**Description:**
Modeling converters: DC-DC converters. Single and three-phase DC-AC and AC-DC power converters. Modeling power electronics systems: UPS Systems, back to back converters, active filters, PV systems.

**Related competencies:**
CC07. CC07 - Apply power electronic systems and power blocks. Identify energy management systems.

**Full-or-part-time:** 4h  
Theory classes: 4h

### Simulation and Control of Power Electronics Systems

**Description:**
Description of a power electronic system: Converters, drivers, signal conditioning circuits, modulators and controllers. Description of a project in power electronics systems: methodology description, simulation tools. Project example: specifications, controllers design, simulation results, and implementation proposal. Simulation of the system described in the example. Projects Proposal.

**Related competencies:**
CC07. CC07 - Apply power electronic systems and power blocks. Identify energy management systems.

**Full-or-part-time:** 8h  
Theory classes: 8h

### Voltage-Sourced Converters in Power Systems: grid integration and operation of distributed energy resource units

**Description:**
Voltage-Sourced Converters in Power Systems: control design and simulation.

**Related competencies:**
CC07. CC07 - Apply power electronic systems and power blocks. Identify energy management systems.

**Full-or-part-time:** 1h  
Theory classes: 1h

### Applications of Electronics Converters in Power Systems

**Description:**
Voltage-Sourced Converters in Power Systems: application to an industrial case and results discussion.

**Related competencies:**
CC07. CC07 - Apply power electronic systems and power blocks. Identify energy management systems.

**Full-or-part-time:** 8h  
Theory classes: 8h
GRADING SYSTEM

50% Simulation and lab exercises
10% Skills assessment
50% Exams

BIBLIOGRAPHY

Basic: