340604 - SEAI-R1010 - Advanced Electronic Systems and Integration of Electrical Energy Sources

**Coordinating unit:** 340 - EPSEVG - Vilanova i la Geltrú School of Engineering  
**Teaching unit:** 710 - EEL - Department of Electronic Engineering  
**Academic year:** 2016  
**Degree:** MASTER'S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012). (Teaching unit Compulsory)  
**ECTS credits:** 5  
**Teaching languages:** Spanish

### Teaching staff

**Coordinator:** 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

| **Total learning time:** 125h | Hours large group: 22h 30m | 18.00%  
| | Hours medium group: 0h | 0.00%  
| | Hours small group: 22h 30m | 18.00%  
| | Guided activities: 0h | 0.00%  
| | Self study: 80h | 64.00%  

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

#### Content

| Modeling Power Electronics Systems | **Learning time:** 4h  
Theory classes: 4h |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Modeling converters: DC-DC converters. Single and thre-phase DC-AC and AC-DC power converters. Modeling power electronics systems: UPS Systems, back to back converters, active filters, PV systems.</td>
</tr>
</tbody>
</table>

| Simulation and Control of Power Electronics Systems | **Learning time:** 8h  
Theory classes: 8h |
|------------------------------------------------------|---------------------|
| **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. |

| Voltage-Sourced Converters in Power Systems: grid integration and operation of distributed energy resource units | **Learning time:** 1h  
Theory classes: 1h |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong> Voltage-Sourced Converters in Power Systems: control design and simulation</td>
<td></td>
</tr>
</tbody>
</table>

| Applications of Electronics Converters in Power Systems | **Learning time:** 8h  
Theory classes: 8h |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong> Voltage-Sourced Converters in Power Systems: aplicacion to an industrial case and results discussion</td>
<td></td>
</tr>
</tbody>
</table>

#### Qualification system

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

Basic:
