Learning objectives of the subject:

The aim of this course is to train students in methods of design, dimensioning and evaluation of power electronic systems.

Learning results of the subject:

- Ability to develop models and design nonlinear control schemes of power electronic systems.
- Ability to analyze and design power electronic systems in single-phase and three-phase applications.
- Ability to evaluate the performance of power electronic systems by simulation tools.
- Ability to program digital signal processors (DSP) for control purposes.
- Ability to develop techniques for the design, analysis and evaluation of electronic systems in applications such as automation, aerospace, energy distribution and generation, consumer electronics, biomedicine, etc.
- Ability to synthesize and solve problems related to the electronic engineering discipline, to apply learning techniques in

Transversal:

1. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.
2. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.
3. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.
230678 - MOSIC - Mosic. Modelling, Simulation and Control of Power Electronic Systems

complex and multiple contexts, to apply previous knowledge to new situations and contexts, as well as the ability to coordinate and work in a team.
- Ability to analyze, design and evaluate electronic systems for power control and energy conversion.

**Study load**

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group: 26h</th>
<th>20.80%</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Hours small group:</td>
<td>13h</td>
</tr>
<tr>
<td></td>
<td>Guided activities:</td>
<td>0h</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>86h</td>
</tr>
</tbody>
</table>

*Total learning time: 125h*
## Content

### Modeling and control of three-phase power converters

<table>
<thead>
<tr>
<th>Description:</th>
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</table>
| - Space-phasor representation and frames  
- Modeling of three-phase power converters  
- Control of three-phase power converters |

<table>
<thead>
<tr>
<th>Learning time: 35h</th>
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</table>
| Theory classes: 8h  
Laboratory classes: 4h  
Guided activities: 10h  
Self study: 13h |

### Simulation of three-phase power converters

<table>
<thead>
<tr>
<th>Description:</th>
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</table>
| - Unity-power-factor rectifiers  
- Uninterruptible power supplies  
- Active power filters |

<table>
<thead>
<tr>
<th>Learning time: 40h</th>
</tr>
</thead>
</table>
| Theory classes: 8h  
Laboratory classes: 4h  
Guided activities: 8h  
Self study: 20h |

### Modeling, simulation and control of electrical micro-grids

<table>
<thead>
<tr>
<th>Description:</th>
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</thead>
</table>
| - Basic concepts of electrical micro-grids  
- Hierarchical control  
- Energy management in micro-grids |

<table>
<thead>
<tr>
<th>Learning time: 50h</th>
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</thead>
</table>
| Theory classes: 10h  
Laboratory classes: 5h  
Guided activities: 8h  
Self study: 27h |
The course is evaluated according to the following items:
* Individual written exams (EXAM).
* Individual or in group exercices (EXER).
* Laboratory classes (LABO).
* Achievement of generical and specific skills (SKIL).

The final mark (FM) is obtained using the following equation:

\[ FM = 0.3 \times \text{EXAM} + 0.3 \times \text{EXER} + 0.25 \times \text{LABO} + 0.15 \times \text{SKIL} \]

### Bibliography

#### Basic:


#### Complementary:
