Degree competences to which the subject contributes

Transversal:

1. 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.
2. 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.

Learning objectives of the subject:

The aim of this course is to train students in including electromagnetic compatibility issues to consider the design of electronic products. First we consider the mandatory international standards and tests. Then, they will study specific electronic design technique to fulfil these requirements.

Learning results of the subject:

- Ability to understand and apply EMC international standards.
- Ability to perform radiated and conducted tests, including ESD, to evaluate electronic designs emissions and immunity.
- Ability to apply specific electronic design techniques to reduce conducted and radiated interferences.
- Ability to apply specific electronic design techniques to improve conducted and radiated immunity.
- Ability to understand and apply International Electromagnetic Compatibility (EMC) standards with special focus in European Directives.
- Ability to plan and perform conducted and radiated EMC tests.
- Ability to design electronic circuits and products taken into account their electromagnetic emission and immunity.
## Study load

<table>
<thead>
<tr>
<th></th>
<th>Hours large group:</th>
<th></th>
<th>Hours medium group:</th>
<th></th>
<th>Hours small group:</th>
<th></th>
<th>Guided activities:</th>
<th></th>
<th>Self study:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total learning time:</strong></td>
<td>125h</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>86h</td>
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<tr>
<td>Hours large group:</td>
<td>13h</td>
<td>10.40%</td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
<td></td>
<td>Hours small group:</td>
<td>26h</td>
<td>20.80%</td>
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<tr>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
<td>Self study:</td>
<td>86h</td>
<td>68.80%</td>
<td></td>
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Last update: 06-05-2019
<table>
<thead>
<tr>
<th>Content</th>
<th>Learning time</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction to Electromagnetic Compatibility (EMC)</strong></td>
<td>8h</td>
<td><strong>Description:</strong> EMC Basics Concepts</td>
</tr>
<tr>
<td><strong>Radiated interferences</strong></td>
<td>36h</td>
<td><strong>Description:</strong> Emission sources and radiating elements, Coupling on cables and PCB, Shielding</td>
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<tr>
<td><strong>Conducted interferences</strong></td>
<td>19h</td>
<td><strong>Description:</strong> Filtering, Transient suppression</td>
</tr>
<tr>
<td><strong>Transients</strong></td>
<td>19h</td>
<td><strong>Description:</strong> Burst, Surge, ESD Protections</td>
</tr>
</tbody>
</table>
# PCB design

**Description:**
Layout design

- **Learning time:** 19h
  - Theory classes: 2h
  - Laboratory classes: 4h
  - Self study: 13h

# EMC standards

**Description:**
European and International Standards

- **Learning time:** 19h
  - Theory classes: 2h
  - Laboratory classes: 4h
  - Self study: 13h

# Numerical Simulation Techniques

**Description:**
FDTD

- **Learning time:** 5h
  - Theory classes: 1h
  - Self study: 4h
Planning of activities

| **Laboratory** | **Hours:** 26h  
| Laboratory classes: 26h |
| --- | --- |
| **Description:** |  
- EMC measurements  
- EMC electronic design techniques |

**SHORT ANSWER TEST (CONTROL)**  
**Hours:** 1h  
Laboratory classes: 1h

**Description:**  
Mid term control.

**EXTENDED ANSWER TEST (FINAL EXAMINATION):**  
**Hours:** 2h  
Theory classes: 2h

**Description:**  
Final examination with theoretical questions and short exercises.

Qualification system

Laboratory assessments: 20%  
Partial examinations and controls: 30%  
Final examination: 50%

Bibliography

**Basic:**

**Complementary:**

**Others resources:**
IEE videos series (5 modules, 13 videos) 1995.