230673 - EMC - Emc in Electronic Design

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering
Academic year: 2017
Degree: DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 1992). (Teaching unit Optional)
DEGREE IN ELECTRONIC ENGINEERING (Syllabus 1992). (Teaching unit Optional)
ERASMUS MUNDUS MASTER'S DEGREE IN PHOTONICS ENGINEERING, NANOPHOTONICS AND BIOPHOTONICS (Syllabus 2010). (Teaching unit Optional)
MASTER'S DEGREE IN INFORMATION AND COMMUNICATION TECHNOLOGIES (Syllabus 2009). (Teaching unit Optional)
MASTER'S DEGREE IN ELECTRONIC ENGINEERING (Syllabus 2009). (Teaching unit Optional)
MASTER'S DEGREE IN ELECTRONIC ENGINEERING (Syllabus 2013). (Teaching unit Optional)
ECTS credits: 5
Teaching languages: English

Teaching staff
Coordinator: Silva Martínez, Ferran
Others: Silva Martínez, Ferran
Pous Sola, Marc

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.

Teaching methodology

- Laboratory practical work
- Short answer test (Control)
- Short answer test (Final Exam)
- Extended answer test (Final Exam)

Learning objectives of the subject

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>Total learning time: 125h</th>
<th>Hours large group: 13h 10.40%</th>
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<tbody>
<tr>
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<td>Hours medium group: 0h 0.00%</td>
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<td>Hours small group: 26h 20.80%</td>
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<td>Guided activities: 0h 0.00%</td>
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<tr>
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<td>Self study: 86h 68.80%</td>
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## Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Learning time:</th>
<th>Description</th>
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| **Introduction to Electromagnetic Compatibility (EMC)** | 8h             | Laboratory classes: 2h  
Self study : 6h |
| **Radiated interferences**        | 36h            | Theory classes: 4h  
Laboratory classes: 8h  
Self study : 24h |
| **Conducted interferences**       | 19h            | Theory classes: 2h  
Laboratory classes: 4h  
Self study : 13h |
| **Transients**                    | 19h            | Theory classes: 2h  
Laboratory classes: 4h  
Self study : 13h |

**Description:**
- Emission sources and radiating elements
- Coupling on cables and PCB
- Shielding
- Filtering
- Transient suppression

**Burst, Surge, ESD Protections**
### 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.