



## Course guides

### 230673 - EMC - Emc in Electronic Design

**Last modified:** 29/04/2020

**Unit in charge:** Barcelona School of Telecommunications Engineering  
**Teaching unit:** 710 - EEL - Department of Electronic Engineering.

**Degree:** MASTER'S DEGREE IN ELECTRONIC ENGINEERING (Syllabus 2013). (Optional subject).  
ERASMUS MUNDUS MASTER'S DEGREE IN PHOTONICS ENGINEERING, NANOPHOTONICS AND BIOPHOTONICS (Syllabus 2010). (Optional subject).  
MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Optional subject).

**Academic year:** 2020    **ECTS Credits:** 5.0    **Languages:** English

#### LECTURER

---

**Coordinating lecturer:** 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 techniques 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

---

Type	Hours	Percentage
Hours small group	26,0	20.80
Hours large group	13,0	10.40
Self study	86,0	68.80

**Total learning time:** 125 h

## CONTENTS

---

### Introduction to Electromagnetic Compatibility (EMC)

**Description:**

EMC Basics Concepts

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

Laboratory classes: 2h

Self study : 6h

### Radiated interferences

**Description:**

- Emission sources and radiating elements
- Coupling on cables and PCB
- Shielding

**Full-or-part-time:** 36h

Theory classes: 4h

Laboratory classes: 8h

Self study : 24h



### Conducted interferences

**Description:**

- Filtering
- Transient suppression

**Full-or-part-time:** 19h

Theory classes: 2h

Laboratory classes: 4h

Self study : 13h

### Transients

**Description:**

Burst, Surge, ESD  
Protections

**Full-or-part-time:** 19h

Theory classes: 2h

Laboratory classes: 4h

Self study : 13h

### PCB design

**Description:**

Layout design

**Full-or-part-time:** 19h

Theory classes: 2h

Laboratory classes: 4h

Self study : 13h

### EMC standards

**Description:**

European and International Standards

**Full-or-part-time:** 19h

Theory classes: 2h

Laboratory classes: 4h

Self study : 13h

### Numerical Simulation Techniques

**Description:**

FDTD

**Full-or-part-time:** 5h

Theory classes: 1h

Self study : 4h



## ACTIVITIES

---

### Laboratory

**Description:**

- EMC measurements
- EMC electronic design techniques

**Related competencies :**

CT4. 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.

**Full-or-part-time:** 26h

Laboratory classes: 26h

### SHORT ANSWER TEST (CONTROL)

**Description:**

Mid term control.

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

Laboratory classes: 1h

### EXTENDED ANSWER TEST (FINAL EXAMINATION):

**Description:**

Final examination with theoretical questions and short exercises.

**Full-or-part-time:** 2h

Theory classes: 2h

## GRADING SYSTEM

---

Laboratory assessments: 20%

Partial examinations and controls: 30%

Final examination: 50%

## BIBLIOGRAPHY

---

**Basic:**

- Williams, T.. EMC for product designers [on line]. 4th ed. Oxford ; Boston: Newnes, 2007 [Consultation: 26/07/2013]. Available on: <http://www.sciencedirect.com/science/book/9780750681704>. ISBN 0750681705.

**Complementary:**

- Paul, C.R. Introduction to electromagnetic compatibility. 2nd ed. New York: John Wiley and Sons, 2006. ISBN 0471755001.

- Balcells, J. [et al.]. Interferencias electromagnéticas en sistemas electrónicos. Barcelona: Marcombo, 1991. ISBN 8426708412.

## RESOURCES

---

**Other resources:**

IEE videos series (5 modules, 13 vídeos) 1995.