

## 67225 - Electromagnetic Compatibility and Electrical Safety

### Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	527 - Master's in Electronic Engineering
ECTS	5.0
Year	1
Semester	First semester
Subject Type	Optional
Module	---

### **1.General information**

#### **1.1.Introduction**

#### **1.2.Recommendations to take this course**

#### **1.3.Context and importance of this course in the degree**

#### **1.4.Activities and key dates**

### **2.Learning goals**

#### **2.1.Learning goals**

#### **2.2.Importance of learning goals**

### **3.Aims of the course and competences**

#### **3.1.Aims of the course**

#### **3.2.Competences**

### **4.Assessment (1st and 2nd call)**

#### **4.1.Assessment tasks (description of tasks, marking system and assessment criteria)**

### **5.Methodology, learning tasks, syllabus and resources**

#### **5.1.Methodological overview**

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, practice sessions, laboratory exercises, and student participation.

- In lectures, the theoretical contents of the course will be explained.
- In practice sessions, representative design problems are presented to students who analyse and solve them.

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- Laboratory work with representative scenarios of EMI/EMC/SE will be addressed during the course.

### 5.2.Learning tasks

The course includes the following learning tasks:

Classroom activities (1.96 ECTS: 49 hours):

- A01 **Lectures** (20 hours). The fundamental contents of the course will be presented and a set of representative problems will be solved. This activity will take place in the classroom. The materials used in the lectures will be available to students at the beginning of the course.
- A02 **Practice sessions** (10 hours). In this activity, a set of representative problems will be solved. This activity will take place in the classroom.
- A03 **Laboratory sessions** (15 hours). Lab exercises are structured in 5 sessions of 3 hours each. Description of the sessions will be available to students at the beginning of the course. Usually, one or two visits to specialized laboratories working on EMI/EMC and safety are scheduled during the course.
- A06 **Guided assignment** (2 hours)
- A08 **Evaluation tests** (2 hours)

Autonomous work (3.04 ECTS: 76 hours):

- A06 **Course work** (20 hours). Students (alone or in pairs) must solve a problem related to the course contents. A practical orientation is encouraged.
- A07 **Study** (56 hours). Time for personal study, exams preparation and tutorials.

### 5.3.Syllabus

The course will address the following topics:

SECTION 1. DESIGN FOR EMI/EMC (75%).

- Fundamentals. EMI generation and coupling. Earth and ground system. EMI/EMC filtering. Design of printed circuits boards (PCBs) for EMI and Signal Integrity. Shielding. Cables. Transients and protection. EMI/EMC special techniques. EMI/EMC problem sets. EMC tests.

SECTION 2. ELECTRICAL SAFETY (25%).

- Electronic risks. Regulations. CE mark. Symbols. Isolation and high voltages. Materials. Fire and temperature risks. Creepage and clearance. Critical components. PCBs. Cables. Mechanical considerations. RF risks. Safety tests. Earthing. EMC and SAFETY.

### 5.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the EINA website.

### 5.5.Bibliography and recommended resources

1. **Basic materials:** will be uploaded at the start of the academic year in <http://moodle2.unizar.es>

2. **Reference bibliography:**

- Henry W. Ott, Noise Reduction Techniques in Electronic Systems, Ed. John Wiley & Sons, 1988.
- Henry W. Ott, Electromagnetic Compatibility Engineering, Ed. John Wiley & Sons, 2009, ISBN-13: 978-0470189306.

## **67225 - Electromagnetic Compatibility and Electrical Safety**

- T. Williams, EMC: Control y Limitación de Energía Electromagnética, Ed. PARANINFO · 1997.
- T. Williams, EMC for Product Designers, Ed. Newnes, 2006, ISBN-13: 978-0750681704 .