

67240 - Electromagnetic Compatibility and Electrical Safety

Syllabus Information

Academic year: 2023/24

Subject: 67240 - Electromagnetic Compatibility and Electrical Safety

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 622 - Master's in Electronic Engineering

ECTS: 6.0

Year: 1

Semester: First semester

Subject type: Optional

Module:

1. General information

"**Electromagnetic Compatibility and Electrical Safety**" presents techniques to design electronic equipment/systems minimizing the risk of Electromagnetic Interference (EMI) problems and/or complying with Electromagnetic Compatibility (EMC) regulations. In addition, design techniques are presented to reduce the risk of Electrical Safety (ES) problems for users, installers, maintenance technicians or installations that host them.

These approaches and objectives are aligned with some of the Sustainable Development Goals, SDGs, of the 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>) and certain specific goals, so that the acquisition of the learning results of the subject provides training and competence to the student to contribute to some extent to their achievement:

Goal 7 (Objectives 7.2 and 7.3), Goal 8 (8.2 and 8.4) and Goal 9 (9.5).

2. Learning results

- Ability to design an electronic system or equipment minimizing Electromagnetic Interference (EMI) problems to comply with Electromagnetic Compatibility (EMC) regulations.
- Ability to deal with an EMI/EMC problem, diagnose its origin and propose solutions to it.
- Ability to design an electronic system or equipment that does not have Electrical Safety (ES) problems and complies with the associated regulations.
- Awareness of the importance of these topics for companies in the electrical/electronic sector.
- Knowledge of the techniques, facilities and equipment used in the testing of electronic products.

3. Syllabus

ELECTRONIC DESIGN ACCORDING TO EMI/EMC (80%)

Fundamentals and basic ideas.

EMI generation and coupling.

Masses and grounds.

EMI/EMC filtering.

Design of printed circuit boards (PCBs) for EMI and Signal Integrity.

Shielding.

EMI/EMC cables.

Transients and protections.

EMI/EMC design complements.

EMI diagnosis and troubleshooting.

Measurement and testing for EMC.

ELECTRICAL SAFETY (ES) (20%):

Risks of an electronic product.

Regulations.

CE mark

Electronic equipment: classification according to ES

Standardized symbology.

Insulation.

Materials.

Maximum heats and temperatures.

Safety separations.

Critical components.

Grounding. Envelopes.

Types of tests and application techniques.

4. Academic activities

Lectures: sessions with the teacher in which the subject's syllabus will be explained: 20 hours

Problems and cases: sessions to solve practical cases proposed by the teacher: 10 hours

Laboratory practice: 15 hours (for example, 5 sessions of 3 hours each).

Teaching assignments: 20 hours

Tutoring of assignments: 2 hours

Personal work and study: 56 hours

Assessment tests: 2 hours

5. Assessment system

Modality: **Global assessment.**

The student must demonstrate that they have achieved the expected learning results through the following assessment activities:

1) Written exam (15%). The written exam will consist of 25 short questions of which the student must answer correctly at least 18 in order to pass it.

Passing the exam amounts to a 15% of the final grade of the subject.

It is mandatory to pass this exam in order to pass the subject.

2) Attendance and evaluation of practical sessions and/or subject's work.

The work done in the laboratory sessions and in the student's non-classroom work time will also be assessed. This activity will account for 85% of the student's grade in the subject.

The student will have a global test in each one of the calls established throughout the academic year.