Universidad Zaragoza

Academic Year/course: 2024/25

67241 - Magnetic design for electronic systems

Syllabus Information

Academic year: 2024/25
Subject: 67241 - Magnetic design for electronic systems
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

The objective of the subject is to train students in the fundamentals of magnetic design for electronic applications and in the knowledge of analysis techniques, simulation and main applications of magnetic devices. It also aims to familiarize them with the appropriate laboratory instruments and some applications of current interest, such as wireless energy transfer.

2. Learning results

Upon completion of the subject, the student will be able to:
-Differentiate the different magnetic components involved in electronic systems, as well as their constituent elements.
-Use the basic tools of mathematical analysis, finite element simulation and design associated with magnetic design in electronic systems.
- Know the basic techniques of magnetic fabrication and design and use the most basic ones.
- Perform measurements and characterization experiments of magnetic elements using specific instrumentation.
- Apply the knowledge acquired in the resolution of real electronic engineering problems in both industrial and domestic environments

3. Syllabus

The program of the subject consists of the following topics:

T1: Fundamentals and magnetic components in power electronics.
T2: Power dissipation in magnetic components.
T3: Non-contact energy transfer systems.
T4: Inductance analysis and design.
T5: Transformer analysis and design
Practical program:
P1: Power dissipation in magnetics.
P2: Finite element simulation of non-contact energy transfer applications.
P3: Experimental characterization of non-contact energy transfer applications.
P4: Design of a non-contact power transfer application
P5: Magnetic design for a high voltage switched-mode power supply.
P6: Assembly and characterization of magnets for switched-mode power supplies.

4. Academic activities

The activities foreseen are:
Classroom activities: 2.4 ECTS (60 hours)
A01 Lecture: approximately 30 hours.
A02 Problem solving and case studies in classroom and seminar: approximately 12 hours.
A03 Laboratory practice: 18 hours

Non-attendance activities: 3.6 ECTS (90 hours)
A06 Teaching assignments and tutoring: approximately 30 hours.
A07 Study: 60 hours approximately. It includes self-study, practice and exam preparation and tutoring.
A08 Assessment tests: 6 hours approximately. It includes the completion of the exam and the review of papers and exam grades.

5. Assessment system

The subject will be evaluated in the **global assessment** modality by means of the following activities in the two official calls:

E1 Open-response written test:
Multiple-choice questions. It will be scheduled in the official calls for exams and will award the C1 grade from 0 to 10 points.

E2 Laboratory practice exam

Students who have obtained a grade below 4 in the continuous evaluation of the practices must take a laboratory exam to be held after the open-response written test.
Practices will be continuously evaluated throughout the academic year by assessing the preparatory work, the laboratory work and the mandatory post-practice reports prepared throughout the term.
This part awards the grade C2 from 0 to 10 points.

E3 Work of the subject:
A work to be defined according to the contents of the subject.
This part awards the grade C3 from 0 to 10 points.

Grading of the subject:
The grade for the subject will be (0.4xC1+0.3xC2+0.3xC3), provided that all of them are higher than or equal to 3. Otherwise, the overall grade for the subject will be the minimum between (0.4xC1+0.3xC2+0.3xC3) and 4.
The subject is passed with a grade higher than or equal to 5 points out of 10.

6. Sustainable Development Goals

7 - Affordable and Clean Energy
9 - Industry, Innovation and Infrastructure
11 - Sustainable Cities and Communities