67228 - Magnetic Design on Electronic Systems

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	527 - Master's in Electronic Engineering
ECTS	5.0
Course	1
Period	First semester
Subject Type	Optional
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

The final grade for this course is based on the following weighting:

- Final exam (50 % of grade)

- Pre-lab work, attendance, attitude, and accomplishment during laboratory sessions (25 %)

- Laboratory reports (25 %)

5.Activities and resources

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5.1.General methodological presentation

The learning-teaching activities designed for this course are as follows: lectures, problem-based learning, and hands-on activities.

- Basics of the course are presented in lectures.

- Some representative cases or problems are proposed to students.

- Hands-on activities include both laboratory experiments and finite-element simulations.

5.2.Learning activities

Learning activities are split in classroom activities and student home work:

Classroom activities (1.96 ECTS, 49 hours)

A01 Lectures (20 hours)

Lectures are intended to present the basics of the course. Notes and other materials are available in the digital teaching resources of the University.

A02 Developing and resolution of problems (10 hours)

Some selected problems are proposed to students and the solution of these problems is developed in classroom sessions. Notes and other materials are also available in the digital teaching resources of the University.

A03 Laboratory sessions (15 hours)

Hands-on activities are intended to reinforce the previously acquired knowledge. These activities include simulation sessions, experiments and prototype developing. Wording, notes and other materials are also available in the digital teaching resources of the University.

A06 Learning-teaching advising (2 hours)

Students are advised by a teacher in order to solve questions or to guide the learning-teaching process.

A08 Evaluation activities (2 hours)

Evaluation consists of an exam and the assessment of the lab activities. This later part is evaluated by means of a set of reports of the developed experiments and simulations.

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Student home work (3.04 ECTS, about 76 hours)

A06 Reports of the lab sessions (20 hours)

This activity is programmed to prepare the reports of the lab sessions. Reports will be made by groups of two students and will consists of the results of the lab activities.

A07 Study (56 hours)

Study time is oriented to prepare the exam, problems and lab sessions.

5.3.Program

The program consists of the following items:

- T1: Basics of the magnetic design for power electronic applications.
- T2: Elements of magnetics.
- T3: Power dissipation in magnetics for power electronic applications.
- T4: Analysis and design of inductances.
- T5: Analysis and design of transformers.
- T6: Planar magnetics.

On the other hand, the programmed lab sessions are:

- P1: Review of lab instrumentation.
- P2: Measurement of power dissipation in magnetics.
- P3: Design of the transformer for a high-voltage power supply.
- P4: Prototyping and testing of the transformer for a high-voltage power supply.
- P5: Finite-element simulation of planar magnetics.

5.4.Planning and scheduling

Schedule of classroom sessions and lab sessions will be programmed by the Engineering School and will be shown in its web site.

5.5.Bibliography and recomended resources

1. Basic materials: in http://moodle.unizar.es

- Classroom notes.
- Wording of the lab sessions.
- Datasheets, other interesting information.

2. Reference books:

- W.G. Hurley, W.H. Wölfle, Transformers and inductors for power electronics, Wiley, 1ª edición, West Sussex (United Kingdom), 2013.
- N. Mohan, T. Undeland, y W.P. Robbins, Power electronics: converters, applications and design, Wiley, 3ª edición, New York, 2003
- A. Barrado, A. Lázaro, Problemas de electrónica de potencia, Prentice Hall, 1ª edición, Madrid, 2007
- Wm.T. McLyman, Transformers and Inductors Design Handbook. Boca Ratón, Florida (USA): CRC Press, 3ª ed., 2004

- A. Van den Bossche, V.C. Valchev, Inductors and transformers for power electronics. Boca Ratón, Florida (USA): CRC Press, 2005

3. Complementary books:

- C.T.A Johnk, Electromagnetic theory, Limusa-John Wiley and Sons, 1999