67228 - Magnetic design for electronic systems

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)

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 %)

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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. It is based on participation and the active role of the student favors the development of communication and decision-making skills. A wide range of teaching and learning tasks are implemented, such as

- Lectures in which the basics of the course are presented.
- Practice sessions in which some representative cases or problems are proposed to students.
- Lab work includes both laboratory experiments and finite-element simulations.

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

5.2.Learning tasks

The course includes the following learning tasks:

Classroom activities (2 ECTS: 50 hours)

- A01 **Lectures** (20 hours). Lectures are intended to present the basics of the course. Notes and other materials are available on the virtual platform of the University.
- A02 **Practice sessions** (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 available on the virtual platform of the University.
- A03 **Laboratory sessions** (15 hours). Practical activities are intended to reinforce the previously acquired knowledge. These activities include simulation sessions, experiments and prototype development. Instructions, notes and other materials are also available on the virtual platform of the University.
- A06 **Tutorials** (2 hours). The teacher solves students' questions or guides the learning-teaching process.
- A08 **Evaluation activities** (3 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.

Autonomous work (3 ECTS: about 75 hours)

- A06 **Reports of the lab sessions** (20 hours). Preparation of the lab session reports. Reports will be made in pairs and will consist on the results of the lab activities.
- A07 **Study** (55 hours). Study time is oriented to prepare the exam, problems and lab sessions.

5.3.Syllabus

The course will address the following topics:

Theory

- Topic 1. Basics of the magnetic design for power electronic applications.
- Topic 2. Elements of magnetics.
- Topic 3. Power dissipation in magnetics for power electronic applications.

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- Topic 4. Analysis and design of inductances.
- Topic 5. Analysis and design of transformers.
- Topic 6. Planar magnetics.

Lab sessions

- 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.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 Engineering School website.

5.5.Bibliography and recommended 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