Universidad Zaragoza

Year : 2019/20

67222 - Advanced Electronic Systems

Syllabus Information

Academic Year: 2019/20
Subject: 67222 - Advanced Electronic Systems
Faculty / School: 110 -

Degree: 527 - Master's in Electronic Engineering

ECTS: 8.0
Year: 1
Semester: First semester
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

The main goal of this subject is to educate students in advanced aspects of analogic and digital electronic systems as well as the knowledge on techniques of analysis, simulation and its main applications. Moreover, knowledge on electromagnetics for advanced electronic systems based on classical laws of electromagnetics in differential form as well as numerical tools based on finite element analysis will be provided. Furthermore, activities aimed at becoming more familiar with the laboratory instruments as well as several practical applications will take place.

1.2.Context and importance of this course in the degree

This subject frames within the compulsory master's subject area. Knowledge gained in this subject is useful for the degree, in particular for both optional specialties, "Power electronic systems" and "Electronics for intelligent ambient". In that way, principles for analysis and design of analogic, digital and power advanced electronic systems working at frequencies comprised from the industrial range to communication systems will be provided.

1.3.Recommendations to take this course

No additional recommendations are necessary because of the master's access requirements.

2.Learning goals

2.1.Competences

Basic competences

CB6. Understanding and having knowledge which provides the basis for being creative in the implementation and/or application of ideas, often, in a research context.

CB7. Students know how to apply the knowledge gained and its possibilities to solve problems in new or poor known environments within larger contexts (or multidisciplinary ones) related to the subject area.

CB8. Ability to assess and select the adequate scientific theory as well as the correct methodology within the fields of study to define judgements from incomplete or limited information including, when pertinent and required, a thought about the social responsibility or ethics associated with the proposed solution for each case.

General competences

CG1. Ability to physical-mathematical model, calculate and simulate in technological and engineering centers, in particular, for research purposes, development and innovation on scope of application related with the electronic engineering and close multidisciplinary fields.

CG4. Ability to address with success the completion of the PhD studies in the Electronic Engineering area.

Specific competences

CE1. Ability to analyze and design advanced analog system for signal processing, intelligent electronic instrumentation and sensing systems.

CE2. Ability to devise and implement advanced digital systems based on programmable devices, configurable logic devices and integrated circuits, with proficiency on hardware description tools.

CE3. Ability to analyze and design components and advance power electronic systems for the high-efficiency energy

processing.

2.2.Learning goals

The student, in order to pass the course, will have to show her/his competence in the following skills:

Ability to identify and classify different kind of advanced analog and digital electronic systems as well as their control and operation modes.

Knowledge to design analogic systems and electronic of instrumentation for advanced applications.

Knowledge to design advanced digital systems based on programmable devices.

Knowledge of several industrial, domestic and medical applications of the aforementioned systems, being able to perform an in-depth design of these systems.

Knowledge of basic electromagnetic for advanced electronic applications, electromagnetics' laws in integral and differential forms as well as their meaning, the boundary conditions for electromagnetic fields, their static formulation and their experimental basis.

Ability to handle and understand the basic tool of numerical solution of electromagnetic systems. In particular, he/she knows how to use these tools to understand the behavior of electronic systems.

Knowledge of the electromagnetics' equation in the low frequency regime (quasi-static approach) by rewritten them into diffusion equations, he/she knows how to apply them in low-frequency cases and he/she is able to perform successfully different laboratory activities for their verification.

Knowledge of the concepts and experimental procedures mentioned in electromagnetic regulations.

2.3.Importance of learning goals

Knowledge, skills and abilities gained with this subject as well as the remainder ones of the Master's in Electronic Engineering, should allow the student to create the competences previously reported as well as to address with success the completion of the PhD studies in the Electronic Engineering area or to discharge properly a professional job in the aforementioned area.

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

The student must prove that they have achieved the expected learning results by means of the following assessment activities:

Exams of theoretical and practical questions.

At the end of each subject's part, a test including questions related to the theoretical concepts as well as the hands-on activities will be performed.

Each part will be marked separately in the scale from 0 to 10 points. The weighting mark (C1) of each part will be calculated and it will suppose 50% of the single overall mar for the student's assessment.

Assessment of hands-on activities and related reports:

The work implemented in the hands-on activities as well as the related reports will be assessed. With respect to the hands-on activities, the following aspects will be considered:

- Preparation in advance of the hands-on activities.
- Correct handling of the laboratory's instrumentation or the simulation tools.
- Degree of fulfilment of proposed tasks.

With respect to the work associated with the hands-on activities, it will consists of a brief as well as the answer for certain question related to its completion.

Each part will be marked in the scale from 0 to 10 points. The weighting mark (C2) of each part will be calculated and it will suppose 50% of the single overall mar for the student's assessment.

Single overall mark:

The single overall mark will be calculated as C1 + C2, provided that the mark in the exam of each part is equal or higher mark to 3. In another case, the single overall mark will be the minimum of C1 + C2 and 4. The subject will be passed for the overall score mark equal or higher to 5.

4.Methodology, learning tasks, syllabus and resources

4.1.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, problem-based learning, practical activities, student participation:

- In lectures, the fundamentals of advanced analog and digital electronic systems and electromagnetics' laws will be explained.

- Problem-based activities and illustrative examples will take place in the practice sessions with the cooperation of students.
- Practical activities will be carried out in the laboratory in small group such as laboratory and finite-element simulations.

4.2.Learning tasks

The course includes the following learning tasks:

Classroom activities (3.2 ECTS, 80 hours)

- A01 **Lectures** (40 hours). In lectures the basic concepts of the course, illustrated with examples, are presented. They take place in the classroom or the computer room.
- A02 **Problem-solving activities** (20 hours). In this activity, a set of illustrative examples will be explained together with the participation of students. This activity will take place in the classroom or the computer room.
- A03 **Laboratory practice sessions** (18 hours). Lab sessions will consist of computer-based simulation sessions or practical arrangements of electronic systems. This activity will take in the computer room or the laboratory.
- A08 **Assessment** (2 hours). It comprises the examination and the assessment of the laboratory-based activities.

Autonomous work (4.8 ECTS, 120 hours)

- A06 **Reports of the lab sessions** (40 hours). Its aim is to prepare the reports of the lab sessions in pairs.
- A07 **Study** (80 hours). This activity comprises study time oriented to progress in the course, preparation for the practical activities as well as the exams and tutorials.

4.3.Syllabus

The course will address the following topics:

Topic 1. Advanced analog electronic systems.

Topic 2. Advanced digital electronic systems.

Topic 3. Applied physics for advanced electronic systems.

4.4.Course planning and calendar

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

The schedule of the activities for the course will be defined by the University of Zaragoza and the Engineering and Architecture School in the academic calendar (which will be available in the Center's website).

With information purposes:

- Class sessions: first semester (Fall).
- Masterclasses and problem-solving sessions: masterclasses and problem-solving sessions are scheduled each week in the classical classroom or the computer room.
- Hands-on activities in the laboratory: students will attend to laboratory sessions and deliver related reports.
- Study delivery: information about the schedule and delivering condition will be provided in the classroom.
- Exam: Exams will be scheduled by the Center for the 1st call and 2nd call, respectively.

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=67222&year=2019