30315 - Digital Electronics

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	438 - Bachelor's Degree in Telecomunications Technology and Services Engineering
ECTS	6.0
Course	2
Period	Second semester
Subject Type	Compulsory
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

5.Activities and resources

5.1.General methodological presentation

The process of teaching and learning designed for this subject is based on the following. It will involve two different training activities with increasing student participation as the course progresses: lectures and laboratory sessions.

- Face-to-face sessions will have an eminently practical orientation. In the more theoretical lectures, the basis of digital systems design will be presented, setting out the fundamental aspects. 1/3rd of these sessions will be dedicated to solving and discussing design problems.
- The second training activity will focus on the laboratory sessions in small groups, where the students will work with design CAD tools.

5.2.Learning activities

The program, offered to the students to achieve the learning goals, includes the following activities:

IN PERSON ACTIVITIES.

Lectures (A01) and exercises and cases solving (A02):

In this activity, the fundamental contents of the subject will be presented, with a practical orientation based on the digital systems design. This activity will take place in person. The necessary materials will be available to students through the ADD.

Laboratory sessions (A03):

This activity is structured in 5 practical sessions of 2.5 hours each. The scripts will be available to students in the ADD well in advance. In these sessions, the required CAD tools for digital electronic design will be used, so that students will acquire the skills and abilities necessary to address digital design.

Evaluation tests (A08): Evaluation activity includes performing a global test.

NOT IN PERSON ACTIVITIES.

Study (T7):

This activity includes personal work aimed at achieving adequate pursuit of the subject, conducting lab sessions and the tutoring process.

5.3.Program

The distribution into thematic units of the theoretical program of the subject is as follows:

- Digital systems fundamentals.

- Boolean algebra.

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- Number systems in digital electronics.

- Hardware description languages (VHDL).

- Combinational logic design.

- Sequential logic design.

- Technological aspects of digital circuits. programmable logic devices, FPGAs.

- Digital systems design.

Labs:

- Introduction to CAD tools. Fire alarm.

- Combinational systems: Seven segments display controller.

- Sequential systems: Universal asynchronous receiver.

- Finite state machines. Universal asynchronous transmitter.

- Number systems. Tone generator (DDS) - Sigma-Delta modulator.

- Design exercise.

(the concrete exercises/designs in each lab can be modified)

5.4.Planning and scheduling

Both theoretical classes and laboratory sessions are held according to the schedule set by the centre (available on the corresponding website). The other activities will be planned depending on the number of students and will be announced well in advance.

Each teacher will inform of the particular tutoring hours.

5.5.Bibliography and recomended resources

1. Basic teaching materials. Available in http://add.unizar.es (To access this resource, the student must be enrolled in the subject).

- **Slides.** They are considered the notes of the subject.
- **Practices scripts.**
- **Supplementary teaching materials.** Set of useful materials for the course: catalogs of manufacturers, component data sheets, CAD tools manuals, etc.

2. Reference books:

- J.I. Artigas, L.A. Barragán, C. Orrite, I. Urriza, "Electrónica Digital. Aplicaciones y problemas con VHDL", Prentice-Hall, 2002.
- J.I. Artigas, L.A. Barragán, C. Orrite, "Aplicaciones y Problemas de Electrónica Digital", Prensas Universitarias de Zaragoza. Colección Textos Docentes, 2007.
- T. Pollán, "Electrónica Digital", Prensas Universitarias de Zaragoza. Colección Textos Docentes, 3ª edición, 2007. http://diec.cps.unizar.es/~tpollan/

3. Complementary references:

- J. F. Wakerley, "Digital Design: Principles and Practices", 4 th Edition, Prentice-Hall, 2006.
- T. L. Floyd "Digital Fundamentals", 11 th Edition, Pearson 2015.
- H. Kaeslin. "Top-Down Digital VLSI Design, From Architectures to Gate-Level Circuits and FPGAs". Morgan Kaufmann Publishers, 2014.