Universidad Zaragoza

Academic Year/course: 2023/24

30396 - Communications electronics laboratory

Syllabus Information

Academic year: 2023/24
Subject: 30396 - Communications electronics laboratory
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 581 - Bachelor's Degree in Telecommunications Technology and Services Engineering
ECTS: 6.0
Year: 4
Semester: Second semester
Subject type: Optional
Module:

1. General information

The Main objective of this subject is that the student learns, and puts into practice, design and debugging strategies of complex electronic systems applied to communications through the implementation of a real system. The subject will deepen at a theoretical level in aspects of digital design oriented both to FPGA and C.I. and relatedCAD tools , and in the interaction of digital systems with analog subsystems or analog-to-digital conversion.

It is recommended to have taken "Digital Electronics for Communications", as well as the subjects of analog/digital electronic content in previous subjects.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (https://www.un.org/sustainabledevelopment/es/), specifically, the learning activities planned in this subject will contribute to the achievement of targets 7.3 and 7.b of Goal 7, and target 9.4 of Goal 9.

2. Learning results

The student:

Will have acquired basic knowledge (DFT, STA, asynchronous design) oriented to the design of digital integrated circuits. And will learn about the possibilities of CAD tools for digital electronics design.

Will learn the electronic techniques for the implementation of analog and digital modulations. Will be able to design small electronic communication blocks, mixing analog and digital electronics.

Will master the basic techniques of assembly, prototyping, and debugging of an electronic communication system. Will handle the necessary laboratory instruments.

Will be able to design, build, test and document an electronic communication block from a specification.

Will have improved your teamwork habits, such as active participation in the work and the ability to integrate efforts to achieve a common goal.

3. Syllabus

Theory:

1.Asynchronous design, STA and CDC.

2.DFT: digital logic test, SCAN and JTAG.

3.DFT: considerations for testing analog PIs in designs.

4.Mask design, and fabrication of ICs.

Practice:

1.Design specifications, planning and objectives.

2.Pre-design: technical considerations, technology selection, block diagram.

3.Electronic design of the transmitter. Prototype construction.

4.Electronic design of the receiver. Prototype construction.

5.System assembly and tuning. Performance evaluation.

4. Academic activities

Lectures: 15 hours

Sessions in which the theoretical contents for FPGA/CI design will be explained

Problems and design cases to be solved in the laboratory: 15 hours

Review of design options for the different modules to be included in the design

Laboratory practices: 30 hours

Integration and functional validation of a PLC communications system

Preparation of documentation related to the design (logbook).

5. Assessment system

I. Mixed system composed of two assessment activities:

a) Assessment of the communications system developed during the term: synthesizability, compliance with STA-CDC restrictions, compliance with DFT rules, implementation efficiency and functionality test at transmission/reception over the 220AC network. This part constitutes 70% of the grade, it is necessary to obtain at least 40% of the grade to average.

b) Practical test of design problems to be solved with the same CAD tools used in the practices of the subject. This part will constitute 30% of the grade, it is necessary to obtain at least 40% of the grade to average.

II. Simple system based exclusively on a single global final test with theoretical-practical questions and problems of design.