Universidad Zaragoza

Academic Year/course: 2023/24

29819 - Digital Electronics

Syllabus Information

Academic year: 2023/24
Subject: 29819 - Digital Electronics
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
326 - Escuela Universitaria Politécnica de Teruel
Degree: 440 - Bachelor's Degree in Electronic and Automatic Engineering
444 - Bachelor's Degree in Electronic and Automatic Engineering
ECTS: 6.0
Year: 2
Semester: Second semester
Subject type: Compulsory
Module:

1. General information

The objective of the subject is to train students in the fundamentals of digital electronics. The basics of digital electronics are studied , and the aim is to achieve the capacity of analysis, design and maintenance of digital electronic systems . This is the first digital subject of the degree. This subject requires knowledge of Fundamentals of Electronics (2nd). It will support the subjects with digital contents of the degree, such as Programmable Electronic Systems(3rd).

These approaches and objectives are aligned with some of the Sustainable Development Goals, SDGs, of the Agenda 2030 (https://www.un.org/sustainabledevelopment/es/) and certain specific targets, in such a way that the acquisition of the learning results of the subject provides training and competence to the student body to contribute to some extent to the achievement of target 7.3 of Goal 7, and target 9.4 of Goal 9.

2. Learning results

- Handle information coding and Boolean algebra and electronically constructs logic functions.
- Explain the functionality of common digital blocks and is able to combine and use them.
- Explain the meaning and functionality of synchronism and takes it into account in designs.
- Apply state graphs to the description of sequential electronic circuits and be able to solve them in terms of Boolean functions.
- Be capable of constructing block diagrams of digital systems of industrial application of certain complexity.
- Explain CMOS technology, is familiar with its functional characteristics, and interpret data sheets of commercial digital integrated circuits.
- Possess the ability to assemble digital circuits in the laboratory for testing and use simulation tools.

3. Syllabus

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- T1. Fundamentals of digital electronics: Boolean gates and functions. Numbering systems. Language of hardware description VHDL.
- T2. Combinational circuits: Combinational digital blocks.
- T3. Sequential circuits: Bistable. Records. Accountants. State machines. Design of digital systems at block level.
- T4. Digital circuit technology: Integrated circuits in CMOS technology.

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- Fundamentals of logic systems.
- Characteristics of digital circuits.
- Combinational blocks.
- Introduction to VHDL.
- Coding and error detection.
- Bistables and registers.
- Programmable Logic Devices.
- Sequential Systems.
- Counters and their applications.

4. Academic activities

- Lectures (30 hours). The syllabus will be explained, relating it to the bibliographic sources in order to encourage self-learning.
- Problem solving and case studies (15 hours). Practical design problems will be solved.
- Laboratory practice (15 hours EINA/12 hours EUPT). They will consist of the implementation of digital circuits, where the design methodology, the use of the instruments and the software tools of laboratory will be practiced. The students will have a script of each practice.
- Teaching assignments (15 EUPT hours). Activities that the students will carry out alone or in groups and that the teacher will proposethroughout the teaching period.
- Personal study and work (84 hours EINA/72 hours EUPT). This activity includes both personal study aimed at achieving the proper monitoring of the subject, the preparation of practices, the exam and tutorials.
- Assessment tests (6 hours)

At EUPT, the course is taught in two different modalities: classroom and blended learning. For the presential modality all of the above applies. In the blended mode, the learning activities will be: Problems and cases, Laboratory practices, Teaching assignments, Study, Evaluation tests and Virtual tutorials.

5. Assessment system

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The assessment of the subject is global. The grade for each activity will be from 0 to 10 points.

- Partial written test: 20%.
- Theoretical-practical exam: 80% o 60%. It will be 80% if the partial test was not taken, or if the grade with this weight is higher than using the grade of the partial test.
- Laboratory practices: 20%.

In the two official examinations, the CT grade obtained from the written exams and the CL grade obtained from the laboratory practicals will be used. The overall grade for the subject will be (0.2*CL+0.8*CT) if the grades CL and CT are greater than or equal to 4 points. Otherwise, the overall grade will be the minimum between 4 and the result of applying the formula above. The subject is passed with an overall grade of 5 out of 10.

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- 1. Theoretical-practical partial mid-term: Maximum 2 points. 20%.
- 2. Practical laboratory work: Maximum 2 points. 20%.
- 3. Theoretical-practical exam: Maximum 6 points. 60%.

Theoretical and practical grades (1 and 3) will be added together. If the result does not exceed 4 points, that will be the final grade. If exceeds them, grade 2 will also be added.

The students will have the right to a global assessment: theoretical and practical exam (80%) and laboratory test (20%), having to obtain at least 4 points in the practical exam to add up the laboratory score.

Semi-attendance mode: Partial: it will be adapted to blended learning. There will be practices with physical presence. The theoretical and practical examwill be common to both modalities.