

## 29641 - Digital Electronic Systems

### Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	430 - Bachelor's Degree in Electrical Engineering
ECTS	6.0
Year	4
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)
- Laboratory work, attendance, attitude, accomplishment during laboratory session , and reports (50 %)

### **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

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wide range of teaching and learning tasks are implemented, such as lectures, guided assignments, laboratory sessions, autonomous work, and tutorials.

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 6 ECTS organized according to:

- Lectures (1.8 ECTS): 45 hours.
- Laboratory sessions (0.6 ECTS): 15 hours.
- Guided assignments (1.0 ECTS): 25 hours.
- Autonomous work (2.4 ECTS): 60 hours.
- Assessment (0.2 ECTS): 5 hours.

### 5.3.Syllabus

The course will address the following topics:

Theory sessions

Topic 1. Implementation technologies of Digital Circuits (6 hours).

Topic 2. Designing Digital Circuits using VHDL (14 hours).

Topic 3. MSP430 Microcontroller Basics (8 hours).

Topic 4. Digital to Analog and Analog to Digital Conversion (6 hours).

Topic 5. Implementation of LTI discrete-time systems (6 hours)

Topic 6. Digital Data Communication Techniques (5 hours).

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### Laboratory sessions

Session 1. Introduction to Digital Circuit Design using Xilinx ISE Tools.

Session 2. VHDL modeling of sequential digital circuits.

Session 3. Angular velocity measurement of a dc motor in real time with an FPGA.

Session 4. PWM generation to control a servo motor using an FPGA.

Session 5. Digital voltmeter design using an MSP430.

Session 6. Sine wave generator design using an MSP430.

### 5.4.Course planning and calendar

Lectures run for 3 weekly hours. Laboratory sessions will take place every 2 weeks (6 sessions in total) and last 2.5 hours each.

For further details concerning the timetable, classroom and further information regarding this course, please refer to the Escuela de Ingeniería y Arquitectura de la Universidad de Zaragoza, website, <https://eina.unizar.es/>.

### 5.5.Bibliography and recommended resources

Basic bibliography could be found in the library website.

[BB: Bibliografía básica / BC: Bibliografía complementaria]

- [BB] Davies, John H.. MSP430 microcontroller basics / John H. Davies . Burlington, MA [etc] : Newnes, cop. 2008
- [BB] Electrónica digital : aplicaciones y problemas con VHDL / José Ignacio Artigas Maestre, Luis Ángel Barragán Pérez, Carlos Orrite Uruñuela, Isidro Urriza Parroqué Madrid [etc.] : Prentice Hall, D. L. 2002
- [BB] Wakerly, John F.. Digital design principles and practices / John F. Wakerly. 4th ed. tenth impression India : Dorling Kindersley, [2013]
- [BC] Floyd, Thomas L.. Fundamentos de sistemas digitales / Thomas L. Floyd ; traducción Vuelapluma ; revisión técnica Eduardo Barrera López de Turiso . - 9ª ed. Madrid [etc.] : Pearson Educación, D. L. 2006
- [BC] Martín del Brío, Bonifacio. Sistemas electrónicos basados en microprocesadores y microcontroladores / Bonifacio Martín del Brío . - 1ª ed. Zaragoza : Prensas Universitarias de Zaragoza, 1999