# Universidad Zaragoza

**Academic Year/course: 2021/22**

# 29845 - Electronic Embedded Systems

## Syllabus Information

**Academic Year:** 2021/22
**Subject:** 29845 - Electronic Embedded Systems
**Faculty / School:** 326 - Escuela Universitaria Politécnica de Teruel
**Degree:** 444 - Bachelor's Degree in Electronic and Automatic Engineering
**ECTS:** 6.0
**Year:** 4
**Semester:** First semester
**Subject Type:** Optional
**Module:**

# 1. General information

## 1.1. Aims of the course

This lecture is focused on embedded systems: Design, types of, fundamentals and analysis.

So, subjects are related with methodologies and tools of follwing: firmware, integration and test

## 1.2. Context and importance of this course in the degree

Embedded systems are a success technologies nowadays. They are involved on almost all of goods around us. Furthermore, they are a essential brick of IoT paradigma

## 1.3. Recommendations to take this course

The student's skills needed to take this lecture are related with computer science -as microcontroller programming- and fundamentals of electronic systems -digital electronic-

# 2. Learning goals

## 2.2. Learning goals

1.- Skills related with design of Systems based on Chip or Single Board Computer

2.- Skills to connect heterogeneous digital systems

3.- Fundamentals of Operating Systems

5.- Fundamentals of Real time systems

## 2.3. Importance of learning goals

Engineers must resolve complex systems on comples and heterogeneous enviorments. So Embedded systems are a right solution for most of them

# 3. Assessment (1st and 2nd call)

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

During lecture
Assessment are based on PBL process, with a 25% of laboratories task and 75% of final project

Global task

Students that have not pass during lecture course, can attend to a global exam with a theoretical part (25%) and laboratory part (75%)

# 4. Methodology, learning tasks, syllabus and resources

## 4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. The course is based on combining theoretical explanations with practical exercises and laboratory work.

- Lectures will provide theoretical background on the fundamentals of embedded systems
- Case studies and real applications will be worked out at the classroom
- The students will do laboratory work connecting different peripherals to a Single Board Computer (SBC) -mainly RaspberryPi platform- and will program the hardware in assembly and C languages
- Individual and group assignments will be proposed
- Student participation is considered very important in order to acquire the learning outcomes and skills needed
- The students will develop a course Project

## 4.2. Learning tasks

The course includes the following learning tasks:

- Lectures,
- Practicum and
- Project course related to the syllabus

## 4.3. Syllabus

The course will address the following topics:

1.- Hw/Sw co-design:

- 32 bits architecture based SoC: fundamentals, development tools and applications

- Reconfigurable systems

2.- Embedded platforms

- Real-time Operating systems: fundamentals and tools

- Embedded systems cross-compiling techniques

3.- Firmware debugging

- Local and remote debugging

4.- Integration and testing

## 4.4. Course planning and calendar

Theoretical classes and practical sessions in the laboratory are taught according to the schedule established by the center (times available on its website). The tutorials will be publicized through the channels established by the Polytechnic University School and on the platform http://moodle.unizar.es

The activities calendar to be carried out will be established once the University and the Center have approved the academic calendar (which can be consulted on the center's website).

The relationship and date of activities, along with all kinds of information and documentation on the subject, will be published at http://moodle.unizar.es/ (Note. To access this website, the student must be registered).

For guidance:

- Every week there are 4 hours of classes scheduled in which theoretical and practical activities will be integrated. Classes will be held primarily in the laboratory

- The additional activities that are scheduled (works and others) will be announced in advance, both in class and at http://moodle.unizar.es/.

- The dates of the exams and tests of official summons will be determined by the direction of the Center.

## 4.5. Bibliography and recommended resources

The bibliography is modified each course depending on the project to be developed.