Universidad Zaragoza

Academic Year/course: 2023/24

30236 - Embedded Systems I

Syllabus Information

Academic year: 2023/24
Subject: 30236 - Embedded Systems I
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 439 - Bachelor's Degree in Informatics Engineering
ECTS: 6.0
Year: 3
Semester: Second semester
Subject type:
Module:

1. General information

The objective of the subject is to train the student in the design and programming of embedded systems. Not only will study the fundamentals, but it is intended to achieve the ability to analyze and design this type of computer systems . The student should be able to: (1) analyze and understand the structure of an embedded system and each of its component subsystems (processor, peripherals, sensors, actuators, etc.) and (2) program the appropriate processing algorithms.

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 goals, so that the acquisition of the learning results of the subject provides training and competence to the student to contribute to some extent to their achievement:

2. Learning results

Have a broad view of the most widespread microprocessors and interfaces in embedded and real-time systems.

Know and know how to use efficiently the usual programming languages in these environments (e.g. C).

Know and knows how to handle development environments for embedded and real-time systems.

Know how to design and build embedded and real-time systems based on microprocessors or other platforms, of low complexity, taking into account security, reliability, fault tolerance and power consumption criteria.

3. Syllabus

Program theory:

1. Introduction: Hardware, development tools, operating systems, languages, applications, restrictions and features.

2. Hardware for embedded systems

3. Development of embedded systems

4. Time management

5. Application development

6.Concurrent applications

Practice program (indicative):

P1. Basic development of an embedded system.

P2. Time management, e.g. programming of a stopwatch.

P3. Discrete control, e.g. elevator control.

P4. Sampled control, e.g. speed control of a motor.

P5 and P6. Concurrent systems, e.g. the control of a washing machine.

4. Academic activities

Lectures (30 hours).

Expository sessions of theoretical and practical contents of the subject.

Problem classes and case resolution (12 hours).

The student will assemble, program and test the operation of embedded systems in the laboratory.

Laboratory practices (18 hours).

The student will assemble, program and test the operation of embedded systems in the laboratory. Each practical will be graded in the laboratory.

Teaching assignments (30 hours).

Activities to be performed by the student alone or in a group

Personal study (54 hours).

Personal study of the theoretical part of the course and problems.

Assessment tests (6 hours)

5. Assessment system

The student's final grade is calculated on the basis of three parts: **laboratory practices** (25%) graded in the practice session itself, assignments and evaluable activities (25%) to be handed in on the dates set, **and** a **final exam** (50%) composed of theoretical-practical questions and problems.

In order to pass this test, a minimum score of 4 points must be obtained in each of them. In case of not having passed the internships or the evaluable works and activities in the teaching period, the student must take a **global test** in the official exams to pass these parts. To take the test on assignments and evaluable activities or the laboratory exam, it is required to have obtained more than 4 points in the final exam. This test consists of a final exam (50%), a test on evaluable work and activities (25%) and a laboratory exam (25%).

In case of not reaching this minimum in any of these parts, the overall grade of the subject will be the minimum between 4.0 and the result of weighting with the percentages of each part.