62226 - Ubiquitous embedded systems

Syllabus Information

Academic year: 2023/24
Subject: 62226 - Ubiquitous embedded systems
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 534 - Master's Degree in Informatics Engineering
ECTS: 6.0
Year: 1
Semester: Second semester
Subject type: Compulsory
Module:

1. General information

The subject and its expected results respond to the following approaches and objectives:

- To help the student know the basic elements of an embedded system and be able to choose among them.
- To help the student understand the different mechanisms of interconnection of devices and applications, their protocols and standards and be able to choose among them.
- To help the student know the development tools and the features of the operating systems.
- To help the student so that they are able to apply this knowledge to build real embedded and ubiquitous systems, physically intertwined and intelligent.

These approaches and objectives are aligned with the Sustainable Development Goals (SDG) of the United Nations 2030 Agenda (https://www.un.org/sustainabledevelopment/es/), specifically, the learning activities provided for in this subject will contribute to the achievement of Objectives 9.5 and 9.c of Goal 9.

2. Learning results

Upon completion of the subject, the student will be able to:

1. Analyse, compare and evaluate the most widespread microprocessors and interfaces in embedded systems.
2. Know the most used operating systems in embedded systems and real time. Know how to port an operating system to a new platform.
3. Know and be able to manage development environments for embedded and real-time systems.
4. Define, evaluate and select the most suitable sensors and networks to build a ubiquitous system.
5. Design and build embedded, real-time, and ubiquitous systems, taking into account criteria of security, reliability, fault tolerance and energy consumption.

3. Syllabus

1. Introduction
2. Embedded Computing: components, programming, time, sequential, sampled, concurrent, cyclic, interruptions
3. IoT, interconnection of sensor networks. Networks, protocols, communications.
4. Smartphones & Wearables
5. SEU & IoT Applications

4. Academic activities

The subject consists of 6 ECTS which correspond to around 150 hours of student work distributed as follows:

- Face-to-face activities: 50 h (master class, problem and case solving, laboratory practices and special practices)
- Completion of practical application or research work: 45 h
- Personalized teacher-student tutoring: 5 h
- Theory study: 45 h
- Assessment tests: 5 h

5. Assessment system

In order to pass the subject, the student must demonstrate they has acquired the foreseen learning results by the following assessment activities:

- Face-to-face **laboratory practices** with periodic deliveries, in which some key aspects of the subject will be covered (20%). Learning results: 3 and 5.
- **Project** . A project in which the knowledge and skills acquired in the subject will be put into practice (50%). Learning results: 1, 2, 3, 4 and 5.
- **Written test** . Open face-to-face test on practical cases proposed by the teachers and the project developed by the student (10%). Learning results: 3 and 5.
- Open oral **presentations and debates** on practical cases proposed by the teachers and the project developed by the student (20%). Learning results: 1, 2, 3, 4 and 5.

The student who does not opt for the evaluation procedure described above , does not pass these tests during the teaching period or who would like to improve their grade will be entitled to a global test that will be scheduled within the exam period corresponding to the first or second call.