Digital Systems and Applications

Academic Year: (2020 / 2021) **Review date: 10/07/2020 18:09:11**

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: SANCHEZ REILLO, RAUL

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

The lecturers strongly advises students who want to take this course have previously studied subjects such as "Digital Electronics", "Electronic Components and Circuits", "Microprocessors" and "Programming". "Digital Electronics" covers combinational and sequential digital electronics, acquiring knowledge about the digital building blocks. The second, "Electronic Components and Circuits", it is important to know the basic electronic components and electronic wiring plate or breadboard test and evaluate its operation using basic tools and laboratory equipment. "Microprocessors" is a subject that teach the basic concepts of a Central Processing Unit and the associated peripherals. Also "Programming" teach how to solve problems in a structured way using programming languages.
If the student does not have this knowledge, they will have to acquire those using on-line courses, such as OCW, SPOC and MOOC. Some of these courses will be offered directly by the lecturers of this course.

OBJECTIVES

CB7: Students should know how to apply the acquired knowledge and to solve problems in new or little-known environments, and within a wider context.
CB8: Students should be able to integrate knowledge and face the complexity to formulate judgements based on information that, even being incomplete or limited, include reflexions about social and ethical responsibilities, linked to the application of their knowledge.
CB10: Students should get the learning abilities that will allow them to keep on learning in a way that they could become autonomous.
CG8: Ability for the continuous and autonomous learning, in IoT related environments.
CE1: Ability to program the development of digital systems, understanding the components and program as integral elements of a product.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction
2. Microprocessors and Microcontrollers
3. Internal Architecture
4. Development Systems
5. Development based on Registers
6. Development based on Hardware Abstraction Libraries
7. Development based on Operating Systems
8. Power Management and Communications
9. Microcontrollers for IoT

The program will be completed with the development of an IoT project by the student, which will be presented orally for being marked.

LEARNING ACTIVITIES AND METHODOLOGY

The above course competences and skills provide skills within the program outcomes, through different activities. For each program outcome, we briefly describe the activities provided within the course:
- In the course, exercises are held where students have to complete/develop their programs to meet

requirements. They are asked to interpret electronic circuit schematics, block diagrams and flowcharts.
- The course includes practical exercises to be developed as homework, and presented at the end of the term. The problem is a manageable version of an electronic system design, where the students must solve using the proposed resources (Microcontroller Development Board, Debugger, peripherals).
- Design and analysis examples are presented to the students as guidance on good programming practices and electronic design techniques, showing how to apply specific peripherals to solve different problems.
- The students are required to work using engineering tools such as a Microcontroller Integrated Development Environment (IDE) program, use a Development Board, as well as a Debugger.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

The evaluation of the course will be based on the following criteria:
1.- Compulsory IoT project, individual or in a group, developing an IoT solution. Total weight of 40% of the final mark.
2.- Final exam, with a total weight of 60% of the final mark. To pass the subject, a minimum mark of 4 over 10 is requested in the final exam.

BASIC BIBLIOGRAPHY

- Development system manufacturer Development system manual, Development system manufacturer.

- Lecturers Collection of exercises, UC3M - Electronics Technology Department.

- Lecturers Collection of notes, slides and additional documentation, UC3M - Electronics Technology Department.

- Microcontoller Manufacturer Microcontroller datasheet, Microcontoller Manufacturer.