

Academic Year: (2022 / 2023)

Review date: 19-05-2022

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: HERNANDEZ CORPORALES, LUIS

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Electronic instrumentation
Microprocessors and microcontrollers

OBJECTIVES

Upon successful completion of this subject, students will be able to:

1. Apply their knowledge and understanding of digital systems and microprocessors to identify, formulate, and solve engineering problems using established methods.
2. Apply their knowledge to develop and carry out embedded system designs that meet specific requirements.
3. Have an understanding of the different methods to develop applications and control algorithms in embedded systems and interfaces with sensors, actuators and auxiliary circuits and the ability to use them.
4. Have technical and laboratory skills.
5. Select and use suitable equipment, tools and methods for the development of embedded systems and analog interface circuits.

DESCRIPTION OF CONTENTS: PROGRAMME

Topic 1: Description of the microprocessor to be used in the laboratory

- 1.1 CPU architecture
- 1.2 Digital Input and Output Pins
- 1.3 Interruptions
- 1.4 A/D and D/A converters

Topic 2: Structure of an embedded application in real time

- 2.1 Real-time operating systems
- 2.2 Periodic interruption (ticker)
- 2.3 Interface with data conversion circuits
- 2.4 PWM signal generation

Topic 3: Example of a study of a control system sampled in real time

- 3.1 Discrete equivalent of an analog integrator
- 3.2 Generalization to control systems with discrete systems
- 3.3 Example of analog PI controller and its digital equivalent

Topic 4: Description of the projects to be carried out

- 4.1 Project development activity
- 4.2 Evaluation and documentation of results

LEARNING ACTIVITIES AND METHODOLOGY

The objective of this course is to integrate the knowledge of electronics acquired during the degree through the development of a small industrial electronics project in the laboratory. This project will include the use of a microprocessor, some instrumentation element and will implement a real-time embedded application with a control function.

The subject has a first block of master classes during which some basic concepts are reviewed and the different projects to be carried out are exposed (2 ECTS). Subsequently, practical work in the laboratory (4 ECTS) will be developed, supported by group and individual tutorials by teachers.

At least one collective tutorial is carried out halfway through the development of the course project.

ASSESSMENT SYSTEM

During the course, students will be divided into small groups and each group will be assigned a project to develop. This project has some milestones that the design has to meet and that will be evaluated by teachers in laboratories and small group classes. The final mark will be composed of:

Final exam:

1) Evaluation of the development of the project in the final laboratory exam: 50% of the grade

Continuous assessment:

2) Delivery of a descriptive written memory of the project carried out: 10% of the grade

3) Evaluation of the minimum requirements of the project during the development of the laboratory: 25% of the grade

4) Submission of three practical reports: 15% of the grade

% end-of-term-examination:	50
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% of continuous assessment (assignments, laboratory, practicals...):	50
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