Industrial Electronics Laboratory

Academic Year: (2023 / 2024) **Review date: 21/04/2023 13:10:24**

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)

It is advisable to have followed the subject "Electronic instrumentation (3º course 2º semester)"
It is advisable to have followed the subject "Microprocessors and microcontrollers (3º course 2º semester)"

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

% end-of-term-examination/test:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

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, specified in the project workbook, 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:

Continuous assessment:
1) Evaluation of the minimum requirements of the project in the laboratory: 25% of the grade
2) Delivery of a written report of the project: 10% of the grade
3) Evaluation of the extended requirements of the project in the laboratory: 50% of the grade
4) Delivery of three practical reports: 15% of the grade

Non-continuous evaluation:
1) Practical exam in the laboratory of the project designated as non-continuous evaluation project at the end of the course: 60% of the mark
2) Delivery of a written report of the project: 10% of the mark
4) Delivery of three practice reports: 15% of the mark