

28828 - Programmable Electronic Instruments

Información del Plan Docente

Academic Year	2016/17
Academic center	175 - Escuela Universitaria Politécnica de La Almunia
Degree	424 - Bachelor's Degree in Mechatronic Engineering
ECTS	6.0
Course	3
Period	Second semester
Subject Type	Compulsory
Module	---

1. Basic info

1.1. Recommendations to take this course

1.2. Activities and key dates for the course

2. Initiation

2.1. Learning outcomes that define the subject

2.2. Introduction

3. Context and competences

3.1. Goals

3.2. Context and meaning of the subject in the degree

3.3. Competences

3.4. Importance of learning outcomes

4. Evaluation

5. Activities and resources

5.1. General methodological presentation

The learning process designed for this subject is based on the following:

Strong interaction between the teacher/student. This interaction is brought into being through a division of work and responsibilities between the students and the teacher. Nevertheless, it must be taken into account that, to a certain degree, students can set their learning pace based on their own needs and availability, following the guidelines set by the teacher.

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The current subject programmable electronic systems is conceived as a stand-alone combination of contents, yet organized into three fundamental and complementary forms, which are: the theoretical concepts of each teaching unit, the solving of problems or resolution of questions and laboratory work, at the same time supported by other activities.

The organization of teaching will be carried out using the following steps:

- **Theory Classes** : Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them in topics and or sections, interrelating them.
- **Practical Classes** : The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.
- **Laboratory Workshop** : The lecture group is divided up into various groups, according to the number of registered students, but never with more than 20 students, in order to make up smaller sized groups.
- **Individual Tutorials** : Those carried out giving individual, personalized attention with a teacher from the department. Said tutorials may be in person or online.

5.2.Learning activities

The programme offered to the student to help them achieve their target results is made up of the following activities...

Involves the active participation of the student, in a way that the results achieved in the learning process are developed, not taking away from those already set out, the activities are the following:

- **Face-to-face generic activities** :
 - o **Theory Classes** : The theoretical concepts of the subject are explained and illustrative examples are developed as support to the theory when necessary.
 - o **Practical Classes** : Problems and practical cases are carried out, complementary to the theoretical concepts studied.
 - o **Laboratory Workshop** : This work is tutored by a teacher, in groups of no more than 20 students.
- **Generic non-class activities** :
 - o Study and understanding of the theory taught in the lectures.
 - o Understanding and assimilation of the problems and practical cases solved in the practical classes.
 - o Preparation of seminars, solutions to proposed problems, etc.
 - o Preparation of laboratory workshops, preparation of summaries and reports.
 - o Preparation of the written tests for continuous assessment and final exams.

The subject has 6 ECTS credits, which represents 150 hours of student work in the subject during the trimester, in other words, 10 hours per week for 15 weeks of class.

A summary of a weekly timetable guide can be seen in the following table. These figures are obtained from the subject file in the Accreditation Report of the degree, taking into account the level of experimentation considered for the said subject is moderate.

Activity	Weekly school hours
Lectures	2

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Laboratory Workshop	2
Other Activities	6

Nevertheless the previous table can be shown into greater detail, taking into account the following overall distribution:

- 30 hours of lectures, with 50% theoretical demonstration and 50% solving type problems.
- 30 hours of laboratory workshop, in 1 or 2 hour sessions.
- 4 hours of written assessment tests, one hour per test.
- 6 Hours of seminars and group tutorials.
- 34 hours supervised of exercises and assignments, divided up over the 15 weeks of the 2 nd semester.
- 50 hours of personal study, divided up over the 15 weeks of the 2 nd semester.

5.3.Program

The contents are distributed in nine teaching units forming treatment indivisible blocks. These topics collect the contents needed for the acquisition of predetermined learning outcomes.

Tema I	Introduction to the design of microprocessor based systems.
Tema II	Architecture of the AVR family.
Tema III	Programming in C.
Tema IV	Input/output digital.
Tema V	Interrupt system.
Tema VI	Timers and counters.
Tema VII	ADC amd DAC. (digital filters)
Tema VIII	Serial Communications.
Tema IX	Advanced microcontrollers.

5.4.Planning and scheduling

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Schedule of Face-to-face generic activities and presentation of papers

The dates of the final exams will be those that are officially published at

<http://eupla.unizar.es/index.php/secretaria/informacion-academica/distribucion-de-examenes>

In continuous evaluation methodology, the students delivering several partial works and a final work whose schedule will be defined during the course.

* The final dates will be published in digital platform (moodle)

The overall test for not continuous evaluation system will be set at the end of the semester and will consist of a written test based on theoretical arguments and problems of all topics covered in class.

5.5. Bibliography and recommended resources

- Han-Way Huang . The Atmel Avr Microcontroller: Mega and Xmega in Assembly and C/ Han-Way Huang . - 1ª edición Cengage Learning, 2013
- Michael Margolis. Arduino CookBook/ Michael Margolis . - 2 edición O'Reilly Media: 2012

Material	Format
Topic theory notes	Paper/repository
Topic presentations	
Topic presentations	Digital/Moodle
Topic problems	E-Mail
Related links	
technical manuals	Paper/repository
	Digital/Moodle
Software compiler and simulator	laboratory work station
Board Arduino UNO ATMEGA328 ATAVRDRAGON emulator, programmer for AVR.	laboratory