SUBJECT TEACHING GUIDE

G1007 - Microcontrollers

Degree in Industrial Electronic Engineering and Automatic Control Systems

Academic year 2023-2024

1. IDENTIFYING DATA

Degree	Degree in Industrial Electronic Engineering and Automatic Control Systems		Type and Year	Compulsory. Year 3
Faculty	School of Industrial Engineering and Telecommunications			
Discipline	Subject Area: Further Digital Electronics Module: Further Specific Technology			
Course unit title and code	G1007 - Microcontrollers			
Number of ECTS credits allocated	6	Term	Semester based (2)	
Web	https://moodle.unican.es/			
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. TECNOLOGIA ELECTRONICA E INGENIERIA DE SISTEMAS Y AUTOMATICA
Name of lecturer	HECTOR POSADAS COBO
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Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 3. DESPACHO PROFESOR (S3006)
Other lecturers	IÑIGO UGARTE OLANO JOSE ANGEL JUAREZ CRESPO

3.1 LEARNING OUTCOMES

- Knowledge of the structure of current microcontrollers and peripherals.
- Ability to program and debug microcontroller based systems using actual development environments.
- Know and use systems with embedded microcontroller within FPGA (microBlaze, nios). Perform applications in prototyping boards.

4. OBJECTIVES
To provide students with required knowledge of the microcontrollers and peripherals structure.
To provide students with ability to apply the concepts of digital system design based on microcontrollers for solving practical problems and work independently.
To provide students with ability to program microcontrollers using an integrated development environment.
To provide students with the knowledge and skills required to develop industrial applications based on FPGA embedded microcontrollers.

6. COURSE ORGANIZATION	
CONTENTS	
1	Introduction to processors and microcontrollers Microcontrollers survey Peripherals, buses and interfaces PIC16F84: architecture and assembler
2	Programming microcontrollers in C and development environments. Use of complex peripherals, simulation and verification
3	32 bits microcontrollers Compilation process and ELF format Memory mapped peripherals: buses and interfaces Microcontrollers in FPGA Peripheral development in VHDL Application on FPGA

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Continuous assessment	Written exam	No	Yes	20,00
Laboratory activities	Laboratory evaluation	No	Yes	50,00
Final exam	Written exam	Yes	Yes	30,00
TOTAL				100,00

Observations

If the student can not participate in an activity of continuous assessment or does not pass it, the corresponding percentage is added to the percentage of the final exam, where it can be recovered.
In the case that the health criteria make it necessary, the evaluation tests will be carried out following the mixed teaching format: classroom and non-classroom classes. In the most extreme case that students and teachers cannot go to the classroom, the assessment tests will be carried out using telematic tools. In these cases, the content of the tests, although similar to the face-to-face case, would be totally or partially individualized for each student.

Observations for part-time students

The percentage for the continuous assessment activities is added to the percentage of the final exam. Laboratory activities can be done in an aoutonomous way, if assistance in the sheduled hours is not possible.

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
J. A. González Vázquez: Introducción a los Microcontroladores. McGraw Hill.
"Embedded Systems Design with Platform FPGAs: Principles and Practices". R. Sass, A. G. Schmidt. Morgan Kaufmann. 2010.
"Designing Embedded Systems with PIC Microcontrollers". Wilmshurst, Tim. Elsevier. 2010.
E. Martín Cuenca, J. M. Angulo Usategui, I. Angulo Martínez: Microcontroladores PIC. La Solución en un Chip