

820256 - PDCA - Programmable Devices for Control and Automation

Coordinating unit:	295 - EEBE - Barcelona East School of Engineering
Teaching unit:	707 - ESAIL - Department of Automatic Control
Academic year:	2015
Degree:	BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional) BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional) BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Optional) BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
ECTS credits:	6
Teaching languages:	English

Teaching staff

Coordinator:	Raúl Benítez
Others:	Raúl Benítez, Josep Maria Guerrero

Prior skills

Basic knowledge on digital systems and logical operations. Elementary knowledge on sequential control systems.

Requirements

Control Industrial i Automatització, Sistemes electrònics

Degree competences to which the subject contributes

Transversal:

1. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

Teaching methodology

Lectures, practical classes, laboratory sessions. Project-based learning. Collaborative learning.

Learning objectives of the subject

The main aim of the course is to introduce programmable logic devices (PLD's) as a practical tool for implementing digital systems such as digital signal processors and discrete-time controllers.

The course will introduce VHDL as the programming language for the design, implementation and test of digital systems. At the end of the course, students are expected to design, implement and test a digital system in areas such as control automation or signal processing.

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Study load

Total learning time: 150h	Hours large group:	30h	20.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	10.00%
	Guided activities:	15h	10.00%
	Self study:	90h	60.00%

Content

(ENG) Inotrduction to Programmable Logic Devices

Degree competences to which the content contributes:

Description:

(ENG) Architecture of PLDs. Different types of PLD: ROM, PLD, CPLD, FPGA. Technologies for the programmable elements.

(ENG) Design, implementation and test of digital systems

Degree competences to which the content contributes:

Description:

(ENG) Introduction to Hardware Description Languages: VHDL. Concurrent and Sequential instructions. VHDL syntax. Testbenching in VHDL.

(ENG) Digital Signal Processing

Degree competences to which the content contributes:

Description:

(ENG) Digital filters. Implementation in VHDL.

(ENG) Discrete-time control systems

Degree competences to which the content contributes:

Description:

(ENG) Sampling in control systems. Discrete PID controller. Implementation in VHDL.



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Qualification system

Follow-up exercises: 25%
Final exam: 25%
Laboratory: 25%
Digital systems project: 25%

Bibliography

Basic:

Mandal, M.; Asif, A. Continuous and discrete time signals and systems. Cambridge: Cambridge University, cop. 2007. ISBN 9780521854559.

Ogata, K. Discrete-time control systems. 2nd ed. Englewood Cliffs, NJ: Prentice-Hall, cop. 1995. ISBN 0133286428.

Hwang, E. O. Digital logic and microprocessor design with VHDL. Mason, OH: Thomson, cop. 2006.