Last update: 24-05-2016

340624 - SDAV-R1P10 - Advanced Digital Systems

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering

Teaching unit: 710 - EEL - Department of Electronic Engineering

Academic year: 2016

Degree: MASTER'S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012). (Teaching unit Optional)

ECTS credits: 5 Teaching languages: Catalan, Spanish, English

Teaching staff

Coordinator: Mariano Lopez Garcia

Others: Mariano Lopez Garcia

Prior skills

Have taken the course of digital systems.

Requirements

knowledge about digital circuits and C programming.

Degree competences to which the subject contributes

Specific:

1. CB10 - Skills that enable to continue studying in a way that should be self-directed and autonomous

2. CB6 - Having the knowledge and understanding to provide a basis or opportunity for originality in developing and / or applying ideas, sometimes in a research context
3. CB7 - Students can apply their knowledge and their ability to solve problems in new or unfamiliar contexts within broader (or multidisciplinary) contexts related to their field of study
4. CB8 - Students will be able to integrate knowledge and handle complexity and formulate judgments from a incomplete or limited information, including reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments
5. CC01 - Ability to research, design, develop and characterize advanced control systems that enable the dynamic system behave according to the operational performance requirements.
6. CC02-apacity and analyzing the results of the advanced control system integrated into the automated process, formulating alternatives in design or implementation if the controlled system does not reach the required specification.
7. CC05 - Analyzing and using microprocessors and microcontrollers as programmable digital devices within a electronical system

Transversal:

8. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.
9. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

Teaching methodology

Continuous assestment.

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Learning objectives of the subject

The aim of this course is that students learn to design embedded systems oriented to control those systems usually employed in automatics, robotics, instrumentation and power electronics.

Study load

Total learning time: 150h	Hours large group:	45h	30.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	10.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

Embedded systems

Learning time: 2h
Theory classes: 2h

Description:
A brief introduction to the internal structure of embedded systems is performed. Some examples are shown as well as their main components.

Related activities:
Theoretical study.

Specific objectives:
Learn the internal structure of embedded systems along with the elements in which their design is based.

Embedded design kit

Learning time: 3h
Theory classes: 3h

Description:
Learning to manage the software package of Xilinx used to design embedded systems: EDK

Design of an embedded system on FPGA

Learning time: 3h
Theory classes: 3h

Description:
The aim of this section is to design a simple embedded system, which will be used by the student to improve his skills managing the EDK.

Global project: design of an embedded system for controlling electrical engines and mechanical systems.

Learning time: 7h
Theory classes: 7h

Description:
The aim is to design a real embedded system, devoted to control motors. Additionally, it should be included mechanical design and instrumentation systems.

Qualification system

Based on the execution of a minproject that includes aspects of digital design, power electronics, instrumentation and control of machines.

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Bibliography

Basic:

Xilinx Spartan-6 FPGA LX9 microboard user guide [Recurs electrònic] [on line]. San José, CA: Xilinx, 2014 [Consultation: 17/03/2016]. Available on: <http://www.em.avnet.com/Support%20And%20Downloads/xlx_s9_lx9_fpga_microboard-ug072711.pdf>.

Microblaze processor reference guide [Recurs electrònic] [on line]. [San José, CA]: Xilinx, 2014 [Consultation: 17/03/2016]. Available on: <http://www.xilinx.com/support/documentation/sw_manuals/xilinx2014_2/ug984-vivado-microblaze-ref.pdf>.

Platform specification format reference manual [Recurs electrònic] : Embedded Development Kit (EDK) 14.1 [on line]. [San José, CA]: Xilinx, 2014 [Consultation: 17/03/2016]. Available on: <http://www.xilinx.com/support/documentation/sw_manuals/xilinx14_4/psf_rm.pdf>.

Embedded system tools reference manual [Recurs electrònic] [on line]. [San José, CA]: Xilinx, 2014 [Consultation: 17/03/2016]. Available on: <http://www.xilinx.com/support/documentation/sw_manuals/xilinx2014_1/ug1043-embedded-system-tools.pdf>.