Course guide
340624 - SDAV-R1P10 - Advanced Digital Systems

Last modified: 17/05/2023

Unit in charge: Vilanova i la Geltrú School of Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.

Degree: **Academic year:** 2023 **ECTS Credits:** 5.0
Languages: Catalan, Spanish, English

LECTURER

Coordinating lecturer: 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.

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

Type	Hours	Percentage
Hours small group	15,0	10.00
Self study	90,0	60.00
Hours large group	45,0	30.00

Total learning time: 150 h

CONTENTS

Embedded systems

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

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

Related activities:
Theoretical study.

Full-or-part-time: 2h
Theory classes: 2h

Embedded design kit

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

Full-or-part-time: 3h
Theory classes: 3h

Design of an embedded system on FPGA

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.

Full-or-part-time: 3h
Theory classes: 3h

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

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

Full-or-part-time: 7h
Theory classes: 7h

GRADING SYSTEM

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

BIBLIOGRAPHY

Basic:
- Xilinx Spartan-6 FPGA LX9 microboard user guide [Recurs electrònic] [on line]. San José, CA: Xilinx, 2014 [Consultation: 06/05/2020]. Available on: https://discovery.upc.edu/iii/encore/record/C__Rb1474365?lang=cat.
- Embedded system tools reference manual [Recurs electrònic] [on line]. [San José, CA]: Xilinx, 2014 [Consultation: 30/04/2020]. Available on: https://discovery.upc.edu/iii/encore/record/C__Rb1474354?lang=cat.
- Platform specification format reference manual [Recurs electrònic] : Embedded Development Kit (EDK) 14.1 [on line]. [San José, CA]: Xilinx, 2014 [Consultation: 05/05/2020]. Available on: https://discovery.upc.edu/iii/encore/record/C__Rb1474356?lang=cat.
- Microblaze processor reference guide [Recurs electrònic] [on line]. San José, CA: Xilinx, 2014 [Consultation: 05/05/2020]. Available on: https://discovery.upc.edu/iii/encore/record/C__Rb1474355?lang=cat.