

Program	09TT- Engineering in Telecommunication Technologies and Services
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Course number and name	
Number	95000033
Name	Digital Systems II Sistemas Digitales II
Semester	Y3-S6

Credits and contact hours	
ECTS Credits	3
Contact hours	30

Coordinator's name	Roberto Barra Chicote
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Specific course information

Description of course content

The goal of this course is to develop a project based on a complex analog-digital electronic system made up of both HW and SW components.
 The student will have to develop the system starting from a general description and basic specifications of the system.
 The course starts with an introduction lecture where the student will receive the information on how to split the system's architecture into different modules, as well as on proper methodologies for the design and programming of electronic systems based on micro-controllers.
 During the course, the student will use available resources at the Laboratory B-043 in order to be able to develop his/her project. Professors will advise in the project's development during the laboratory sessions
 Finally, the student will have to write a technical document with the description of the developed system and its implementation process.

List of topics to be covered

1. Description of the Electronic system
 - 1.1. General description of the system to be implemented during the course
 - 1.2. Analysis and modular decomposition of the system
 - 1.3. Modules description
 - 1.4. Modules interaction
 - 1.5. Description of the system's basic specifications
2. Real time architecture of the system
 - 2.1. General programming rules
 - 2.1.1. Description and familiarization with and IDE
 - 2.1.2. Program debugging
 - 2.1.3. Design based on a main and interrupt service routine concepts
 - 2.2. Basic implementation rules
 - 2.2.1. Hardware

2.2.2. Periodic, internal and external interruption management 2.2.3. Implementation of a Main Process 2.3. Problem detection and problem solving 3. Control and E/S modules 3.1. Implementation and/or control of several modules: A/D, D/A, keyboards, switches, buttons, screens, displays, digital ports, serial communication (RS232) 3.2. Problem detection and problem solving 4. Technical documentation and Oral presentation 4.1. Elaboration of a technical documentation of the implemented system 4.2. Description of the measures and carried out system tests 4.3. Oral presentation of the design and implementation steps applied to the system		
Prerequisites or co-requisites		
Recommended previous courses: Digital Electronic, Analog Electronic Circuits Digital Systems I, Program skills		
Course category in the program		
<input checked="" type="checkbox"/> R (required)	<input type="checkbox"/> E (elective)	<input type="checkbox"/> SE (selective elective)

Specific goals for the course
Specific outcomes of instruction
RA70 – Knowledge about electronic devices, circuits, electronic equipment and electronic systems
RA75 – Ability to specify, implement, document and use of electronic systems and
RA214 – Innovation and Creativity applied to electronic systems
Student outcomes addressed by the course
CE-SE3, CE-SE5, CG10, CG12

Bibliography and supplemental materials
<ul style="list-style-type: none"> • Aspectos prácticos de diseño y medida en Laboratorios de Electrónica, Notes at the reprographics service center at the ETSIT-UPM. • “<i>Introducción a los Sistemas Digitales con el microcontrolador MCF5272</i>”, R. San Segundo et al, Ed. Marcombo S.A., 2006 • “<i>Diseño de sistemas digitales con el microcontrolador ColdFire 5272</i>”, C. Carreras, R. Córdoba, M.J. Ledesma, J.M. Montero, R. San Segundo, 3a edición, Dpto. de Ingeniería Electrónica, E.T.S.I. Telecomunicación, UPM, 2012. • “<i>Entorno de desarrollo EDColdFire V3.0</i>”, Tutorial available at the Moodle Portal

Teaching methodology			
<input checked="" type="checkbox"/> lectures	<input type="checkbox"/> problem solving sessions	<input type="checkbox"/> collaborative actions	<input checked="" type="checkbox"/> laboratory sessions
Other:	Project Based Learning Methodology		