

Program	09TT- Engineering in Telecommunication Technologies and Services
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Course number and name	
Number	95000025
Name	Electronic Circuits Circuitos Electrónicos
Semester	Y3-S5

Credits and contact hours	
ECTS Credits	3
Contact hours	30

Coordinator's name	Juan Antonio López Martín
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Specific course information

Description of course content

The main objective of this course is to learn the methodology to design a basic electronic circuit prototype. This prototype consists of two parts (analog and digital), that must be developed from its global description and functional specifications. The students must also perform the modular system decomposition.

This course has theoretical classes in which the students receive information about the decomposition into modules, the most suitable methods to perform the design, and practical recommendations about how to implement the prototype on insertion plates and how to develop VHDL descriptions. In addition, these classes will also provide appropriate procedures to detect malfunctions and to solve them, along with the development of the system.

During the course, the students will use the hardware and software equipment available in the B-043 laboratory to develop the prototype with the assistance of the teachers.

Finally, the students must write a technical report about the circuit and the decisions that they have taken.

List of topics to be covered

1. Basic concepts and general description project. 2. Synthesis of sample VHDL blocks. 3. Implementation and characterization of basic analog blocks. 4. Implementation of the analog modules required for the project. 5. Implementation of the VHDL modules. 6. Verification and characterization. 7. Implementation of improvements.

Prerequisites or co-requisites

Due to the objectives of this course, it is strongly recommended to be familiar with the concepts covered in the following courses: Circuit Analysis (E), Introduction to Electronics (E), Digital Electronics (E), Analog Electronics (E)

Course category in the program

<input checked="" type="checkbox"/> R (required)	<input type="checkbox"/> E (elective)	<input type="checkbox"/> SE (selective elective)
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Specific goals for the course

Specific outcomes of instruction

Upon successful completion of the course the students will be able to :

RA70: Demonstrate knowledge about electronic devices, circuits, equipment & systems.

RA71: Demonstrate knowledge of electronic circuits design techniques.

RA72: Possess knowledge about negative feedback and electronic control systems theory.

RA73: Know about electronic instrumentation and electronic measurement systems.

RA75: Specify, implement, document and use electronic equipment and systems.

RA209: Resolve problems that arise throughout the development of a complete electronic system.

RA210: Create a complete technical documentation on the design performed and orally explain the way of operation and the details of their work.

RA552: Interpret the functioning, the performance characteristics and the limitations of the components through the specification sheets.

RA553: Modularly design a complete analog-digital electronic circuit based on a specifications document within a team.

RA554: Individually design the analog modules that compose the system, taking into account their interactions.

RA555: Individually design the digital modules and adequately describe them employing a hardware description language.

RA556: Use the laboratory equipment and tools (function generator, power supply and oscilloscope) to verify the functioning of the designed modules.

Student outcomes addressed by the course

CG-6, CG-7, CG-8, CG-10, CG-12, CE-SE3, CE-SE5, CE-SE8

Bibliography and supplemental materials

- “Design with Operational Amplifiers and Analog Integrated Circuits” (3rd ed.), S. Franco, McGraw-Hill, 2002.
- “Digital Design” (4th ed.), J.F. Wakerly, Prentice Hall, 2005.
- “Circuitos Electrónicos: Análisis, diseño y simulación”, N Malik, Prentice-Hall, 1996.
- “Guía de referencia de la tarjeta BASYS 2”, Álvaro G. Fernández. [moodle web page]
- “Aspectos prácticos de diseño y medida en Laboratorios de Electrónica” (2nd ed.) , J. Ferreiros, J. Macías, J.M. Montero, F. Moreno, J.A. Muñoz, S.E. Palazuelos, J. Pastor, R. San Segundo, M.J. Ledesma. Departamento de Publicaciones, ETSIT-UPM.

Teaching methodology

<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> problem solving sessions	<input checked="" type="checkbox"/> collaborative actions	<input checked="" type="checkbox"/> laboratory sessions
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Other: PBL, examples and case studies, management of web resources, ...