

**1. General information****Course:** DIGITAL ELECTRONICS I**Type:** CORE COURSE**Degree:** 417 - UNDERGRAD. IN INDUSTRIAL ELECTRONICS AND AUTOMAT. ENGINEERING**Center:** 602 - E.T.S. INDUSTRIAL ENGINEERING OF C. REAL**Year:** 3**Main language:** Spanish**Use of additional languages:** English**Web site:****Code:** 56504**ECTS credits:** 6**Academic year:** 2022-23**Group(s):** 20**Duration:** First semester**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** JAVIER VAZQUEZ DEL REAL - Group(s): 20

Building/Office	Department	Phone number	Email	Office hours
Politécnico/2-D10	INGENIERÍA ELÉCTRICA, ELECTRÓNICA, AUTOMÁTICA Y COMUNICACIONES	vía Teams	javier.vazquez@uclm.es	

2. Pre-Requisites

Knowledge of the principles of Electric Circuit Analysis.

Knowledge of the foundations of Electronics.

To be familiar with the use of computers and software packages applied to engineering.

3. Justification in the curriculum, relation to other subjects and to the profession

The goal of the degree in Industrial Electronics and Control Engineering is to educate students that will become electronic engineers. Students are trained to perform tasks related to the design, development and maintenance of products manufactured by the electronic industry.

The main objective of Electrónica Digital I is to provide students with core knowledge regarding both theoretical and practical aspects of the analysis and the design of digital electronic circuits.

By the end of the term students taking this course should be able to:

- Identify and understand up-to-date underlying technologies on which the microfabrication of digital circuits is based.
- Understand how switching devices operate in a digital circuit, especially with CMOS logic.
- Apply a range of methods and techniques intended to simplify logic expressions.
- Solve design problems using the typical building blocks involved in digital logic design.

Ideally, students taking Electrónica Digital I should have previously attended and passed subjects in, at least, electric network theory and fundamentals of analog electronics. The fundamentals of digital logic taught in Electrónica Digital I are an essential starting point to study more advanced topics in this area of expertise, specifically in programmable digital logic and computer architecture, subjects which are also studied in the degree.

4. Degree competences achieved in this course**Course competences**

Code	Description
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CEE03	Knowledge of the fundamentals and applications of digital electronics and microprocessors.
CEE06	Ability to design analogue, digital and power electronic systems.
CEE07	Knowledge and capacity for systems modeling and simulation.
CG03	Knowledge of basic and technological subjects to facilitate learning of new methods and theories, and provide versatility to adapt to new situations.
CG04	Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of industrial engineering.
CG06	Ability to handle specifications, regulations and mandatory standards.
CT01	Knowledge of a second language.
CT02	Knowledge and application of information and communication technology.
CT03	Ability to communicate correctly in both spoken and written form.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Capacity to analyse, design, model and simulate combinational and sequential digital circuits, using basic elements, functional blocks and hardware description languages (HDL).

Additional outcomes

The hardware Description Languages (HDLs) will be covered in Electrónica Digital II, with emphasis on VHDL.

6. Units / Contents

Unit 1: Overview of digital systems

Unit 2: Number systems and codes

Unit 3: Logic families

Unit 4: Combinational logic

Unit 5: Sequential logic

Unit 6: Programmable logic devices

Unit 7: Memory circuits

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	CB01 CB04 CB05 CEE03 CEE06 CEE07 CG03 CG04 CG06 CT01 CT02 CT03	1.2	30	N		Lectures in the classroom using the ordinary resources (slide projection and blackboard)
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CB02 CB04 CB05 CEE03 CEE06 CEE07 CG03 CG04 CG06 CT01 CT02 CT03	0.4	10	N		Lectures focused on problem solving using the blackboard
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	CB03 CB04 CB05 CEE03 CEE06 CEE07 CG03 CG04 CG06 CT01 CT02 CT03	0.6	15	Y	Y	Practical case studies focused on the analysis and design of combinational and sequential logic circuits.
Formative Assessment [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB04 CB05 CEE03 CEE06 CEE07 CG03 CG04 CG06 CT01 CT02 CT03	0.2	5	Y	Y	Individual written assessment
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB04 CB05 CEE03 CEE06 CEE07 CG03 CG04 CG06 CT01 CT02	3.6	90	N		Personal study
Total:			6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Final test	60.00%	60.00%	The written exam will consist of a number of questions and problems to be solved.
Laboratory sessions	25.00%	25.00%	Drafting of a lab report describing the work carried out in the laboratory.
Projects	15.00%	15.00%	Individual report.
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

Students will score a final mark that will result from the assessment of the three contributions listed in the evaluation criteria and their corresponding weights. The three parts must be passed.

Non-continuous evaluation:

Students will score a final mark that will result from the assessment of the following three contributions:

- Written test (60%)
- Implementation of at least one case study in the laboratory (25%)
- Delivery of an individual report (15%)

Specifications for the resit/retake exam:

The marks corresponding to those parts that were passed in the final exam will be saved for the resit exam.

Specifications for the second resit / retake exam:

Same criteria as for the final exam

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	30
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	10
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Formative Assessment [PRESENCIAL][Assessment tests]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Global activity	
Activities	hours
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	10
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Formative Assessment [PRESENCIAL][Assessment tests]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Class Attendance (theory) [PRESENCIAL][Lectures]	30
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
C. Roth	Fundamentos de diseño lógico, 5. ^a ed.	Thomson		9788497322867	2004	
J. García Zubía	Problemas resueltos de electrónica digital	Thomson		9788497321952	2003	
J. García Zubía, I. Angulo Martínez, J.M. Angulo Usategui	Sistemas digitales y tecnología de computadores, 2. ^a ed.	Thomson		9788497324861	2007	
J.F. Wakerly	Diseño digital. Principios y prácticas 3. ^a ed.	Prentice Hall		9789702607205	2001	
J.M. Angulo Usategui, J. García Zubía	Sistemas digitales y tecnología de computadores	Paraninfo		9788497320429	2002	
S. Brown, Z. Vranesic	Fundamentals of digital logic with VHDL design, 3rd ed.	Mc Graw Hill		9780071268806	2009	
V.P. Nelson, H.T. Nagle, B.D. Carrol, J.D. Irwin	Análisis y diseño de circuitos lógicos digitales	Prentice Hall		9789688807064	1996	
J. Vázquez	Circuitos lógicos digitales: del diseño al experimento, 2. ^a ed.	Marcombo		9788426729835	2020	
E. Mandado, J.L. Martín	Sistemas electrónicos digitales, 10. ^a ed.	Marcombo		9788426721983	2015	
S. Acha y otros	Electrónica digital. Lógica digital integrada, 2. ^a ed.	Ra-Ma		9788478979677	2010	
T.L. Floyd	Fundamentos de sistemas digitales, 11. ^a ed.	Pearson		9788490353004	2016	
V.P. Nelson, B.D. Carroll, H.T. Nagle, J.D. Irwin	Digital logic circuit analysis and design, 2nd ed.	Pearson		9780135297070	2021	
A. Adán Oliver, I. Sánchez Ciudad, B. Quintana Galera	Circuitos digitales: problemas y ejercicios resueltos	Ra-Ma		9788499647616	2018	
J.F. Wakerly	Digital design. Principles and practices, 5th ed.	Pearson		9780134460093	2018	