



## Teaching Guide

Identifying Data					2024/25
Subject (*)	Electronics Technology	Code	614G01005		
Study programme	Grao en Enxeñaría Informática				
Descriptors					
Cycle	Period	Year	Type	Credits	
Graduate	2nd four-month period	First	Basic training	6	
Language	SpanishGalicianEnglish				
Teaching method	Face-to-face				
Prerequisites					
Department	Enxeñaría de Computadores				
Coordinador	García Naya, José Antonio	E-mail	jose.garcia.naya@udc.es		
Lecturers	Bregains Rodriguez, Julio Claudio Castro Castro, Paula Maria García Naya, José Antonio Gonzalez Lopez, Miguel Iglesia Iglesias, Daniel Ismael Lamas Seco, Jose Juan Rodas González, Javier	E-mail	julio.bregains@udc.es paula.castro@udc.es jose.garcia.naya@udc.es miguel.gonzalez.lopez@udc.es daniel.iglesia@udc.es jose.juan.lamas.seco@udc.es javier.rodas@udc.es		
Web	estudos.udc.es/es/subject/614G01V01/614G01005/				
General description	<p>The subject of Electronic Technology in the Degree in Computer Engineering is fundamental both for the degree and for the professional career in computer engineering. In this course, students will explore the physical principles of semiconductors, logic circuits, and the technology behind electronic devices. This knowledge is essential for understanding and designing electronic circuits, which is crucial in the creation of all kinds of computer systems. The importance of this subject is reflected in its application in cutting-edge areas such as the Internet of Things (IoT), mobile devices, communications, and cybersecurity, to name a few. Graduates with a solid foundation in electronic technology will be better prepared to innovate and develop new technological solutions, addressing current and future challenges in the industry. This subject not only provides a solid theoretical foundation but also offers opportunities to apply this knowledge in practical projects, preparing students to play a crucial role in technological advancement.</p>				

## Study programme competences / results

Code	Study programme competences / results
A2	Comprensión e dominio dos conceptos básicos de campos e ondas, e electromagnetismo, teoría de circuítos eléctricos, circuítos electrónicos, principio físico dos semicondutores e familias lóxicas, dispositivos electrónicos e fotónicos e a súa aplicación para a resolución de problemas propios da enxeñaría.
B1	Capacidade de resolución de problemas
B3	Capacidade de análise e síntese
C2	Dominar a expresión e a comprensión de forma oral e escrita dun idioma estranxeiro.
C6	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.

## Learning outcomes

Learning outcomes	Study programme competences / results		
To learn fundamental physical concepts governing computer functioning: electrical and electronic circuits.	A2	B1 B3	C2 C6
Practical applications of the solid-state devices and analog and digital integrated circuits.	A2	B1 B3	C2 C6

## Contents



Topic	Sub-topic
Chapter 1. Electric circuits	1.1 Basic concepts of electricity. Ohm's law. 1.2 Voltage and current sources. Power. 1.3 Electrical circuits. Kirchhoff's laws. 1.4 Circuits theorems.
Chapter 2. Charging and discharging capacitors. Amplifiers	2.1 Waveforms. Fundamental parameters. 2.2 Behavior of the capacitor parameters with respect to time. 2.3 R-C circuits in the time domain. 2.4 R-C Integrator and differentiator circuits. 2.5 Foundations of amplifiers
Chapter 3. Semiconductor diodes	3.1 Physical principles of semiconductor devices. 3.2 p-n junction. 3.3 Diode V-I characteristic. Linear models. 3.4 Avalanche diodes. LED. Photodiodes.
Chapter 4. Transistors	4.1 MOSFET unipolar transistors. 4.2 V-I characteristic in common-source mode. 4.3 Operational regions and linear equivalent models. 4.4 MOSFET transistors in amplifying and switching modes.
Chapter 5. Logic circuits	5.1 Introduction. General properties of digital circuits. 5.2 The CMOS inverter. 5.3 CMOS gates. 5.4 CMOS families.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A2 B1 B3 C2 C6	30	42	72
Laboratory practice	A2 B1 B3 C2 C6	20	30	50
Problem solving	A2 B1 B3 C2 C6	10	14	24
Mixed objective/subjective test	A2 B1 B3 C2 C6	3	0	3
Personalized attention		1	0	1

(\*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	In the lecture sessions, theoretical content will be presented through oral presentations supported by audiovisual media and a blackboard. Additionally, numerous examples will be used, and practical problems will be solved. This methodology includes introducing questions directed at students to promote learning and knowledge construction.
Laboratory practice	In the laboratory practices, students will engage in practical activities focused on circuit analysis. They will use electronic boards, instrumentation equipment, and measurement and circuit simulation software. This methodology allows students to apply theoretical concepts in a practical environment, facilitating deeper learning and a comprehensive understanding of electronic systems.
Problem solving	Students will actively participate in solving problems specific to electronic technology, which will be related to the practical cases addressed in the laboratory. These problems will focus on the analysis of electrical and electronic circuits, as well as understanding the operation of basic electronic circuits, including logic gates. Additionally, students will tackle exercises designed to reinforce their understanding of fundamental concepts.
Mixed objective/subjective test	The mixed exam will be a final evaluative activity in which students must demonstrate their knowledge through a combination of theoretical questions and problem-solving. This written exam will allow for a comprehensive and integrated treatment of the knowledge acquired throughout the course.



## Personalized attention

Methodologies	Description
Guest lecture / keynote speech Laboratory practice Problem solving	Personalized attention will be applied to the three teaching methodologies: lecture sessions, laboratory practices, and problem solving. This attention will involve guiding and mentoring the learning process in various activities, aiming to help students significantly understand the information, integrate it into their knowledge structure, and engage actively. Additionally, it seeks to motivate students and encourage their active participation in the teaching-learning process.

## Assessment

Methodologies	Competencies / Results	Description	Qualification
Laboratory practice	A2 B1 B3 C2 C6	Continuous assessment, with feedback from the teaching staff, of the work carried out by students in laboratory practices.	30
Problem solving	A2 B1 B3 C2 C6	Continuous assessment, with feedback from the teaching staff, of the work carried out by students in the problem-solving sessions.	20
Mixed objective/subjective test	A2 B1 B3 C2 C6	The mixed exam will consist of providing written answers to a combination of theoretical questions and problem-solving tasks. It will be held on the dates set in the faculty's exam schedule.	50

## Assessment comments

<p>First opportunity</p> <p>Students who do not take the mixed exam will be graded as "not presented."</p> <p>The total grade (0 to 10 points) is obtained from the sum of the laboratory practices (0 to 3 points), problem-solving (0 to 2 points), and the mixed exam (0 to 5 points).</p> <p>To pass the subject, the following two conditions must be met:</p> <ol style="list-style-type: none"><li>1) The total grade is greater than or equal to 50% (5 points of the total grade).</li><li>2) The grade of the mixed exam is greater than or equal to 15% (3 points out of 10 of the mixed exam grade). Otherwise, the total grade will be halved.</li></ol> <p>Second opportunity</p> <p>Only the mixed exam will be assessed on the date indicated in the faculty's exam schedule. The conditions for grading as "not presented" and for passing the course are the same as in the first opportunity.</p> <p>Early opportunity</p> <p>Same conditions as in the case of the second opportunity.</p> <p>All aspects related to academic exemption, study dedication, retention, and academic fraud will be governed in accordance with the current academic regulations of the UDC.</p>
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## Sources of information

<b>Basic</b>	- (. . Nahvi, Mahmood, and Joseph A. Edminister. Circuitos eléctricos y electrónicos. 4a ed., McGraw-Hill, 2005. [URL]Hambley, Allan R. Electronica. 2a ed., Prentice-Hall, 2008. [URL]
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<b>Complementary</b>	<p>Brégains, Julio Claudio, and Paula María Castro Castro. Electricidad básica: problemas resueltos. Starbook, 2012. [URL]Brégains, Julio Claudio, and Paula María Castro Castro. Electrónica básica: problemas resueltos. Starbook, 2013. [URL]Boylestad, Robert L. Introducción al análisis de circuitos. 13a ed., Pearson, 2017. [URL]Scott, Donald E. Introducción al análisis de circuitos: un enfoque sistemático. McGraw-Hill, 1988. [URL]Sedra, Adel S., and Kenneth C. Smith. Circuitos microelectrónicos. 5a ed., McGraw Hill, 2006. [URL]Malvino, Albert Paul, and David J. Bates. Principios de electrónica. 7a ed., McGraw-Hill, 2007. [URL]Boylestad, Robert L., and Louis Nashelsky. Electrónica: teoría de circuitos y dispositivos electrónicos. 10a ed., Prentice Hall, 2009. [URL]Boylestad, Robert L., et al. Electrónica: teoría de circuitos y dispositivos electrónicos. 11a ed., Pearson Educación, 2018. [URL]Malik, Norbert R. Circuitos electrónicos: análisis, simulación y diseño. Prentice Hall, 1996. [URL]Rashid, Muhammad H. Circuitos microelectrónicos: análisis y diseño. Paraninfo, 2002. [URL]</p>
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## Recommendations

Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

Other comments

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.