



Teaching Guide				
Identifying Data				2021/22
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	Bregains Rodriguez, Julio Claudio	E-mail	julio.bregains@udc.es	
Lecturers	Bregains Rodriguez, Julio Claudio Castro Castro, Paula Maria Domínguez Bolaño, Tomás Fernández Caramés, Tiago Manuel Fraga Lamas, Paula García Naya, José Antonio Gonzalez Lopez, Miguel Iglesia Iglesias, Daniel Ismael Lamas Seco, Jose Juan Vazquez Araujo, Francisco Javier	E-mail	julio.bregains@udc.es paula.castro@udc.es tomas.bolano@udc.es tiago.fernandez@udc.es paula.fraga@udc.es jose.garcia.naya@udc.es miguel.gonzalez.lopez@udc.es daniel.iglesia@udc.es jose.juan.lamas.seco@udc.es francisco.vazquez@udc.es	
Web	campusvirtual.udc.es			
General description	Physical principles of semiconductors and logic families. Electronic and photonic devices. Electronic circuits.			
Contingency plan	<p>1. Modifications in the contents.</p> <ul style="list-style-type: none"> <li>- No changes will be made.</li> </ul> <p>2. Methodologies</p> <p>*Teaching methodologies that are maintained</p> <ul style="list-style-type: none"> <li>- Guest lectures.</li> <li>- Laboratory practices (evaluable).</li> <li>- Problem solving (evaluable).</li> <li>- Mixed test (evaluable).</li> </ul> <p>*Teaching methodologies that are modified</p> <ul style="list-style-type: none"> <li>- Additional sessions through Teams: Guest lectures, Problem solving (GRT), Laboratory classes (to solve doubts).</li> </ul> <p>3. Mechanisms of personalized attention to the students</p> <ul style="list-style-type: none"> <li>- Email: Daily. To be used to make inquiries or request virtual meetings for solving doubts.</li> <li>- Teams: for tutorial services within the timeframes established for the subject in the faculty's classroom calendar; and for attentions out of those timeframes, within the timetables explicitly established by some of the subject's teachers.</li> </ul> <p>4. Modifications in the evaluation</p> <ul style="list-style-type: none"> <li>- No changes will be made.</li> </ul> <p>*Evaluation observations: the same mechanism (moodle tests) may be used in the evaluation of the seminars and the mixed test.</p> <p>5. Modifications of the bibliography or webgraphy</p> <ul style="list-style-type: none"> <li>- No changes will be made.</li> </ul>			



Study programme competences	
Code	Study programme competences
A2	Comprensión e dominio dos conceptos básicos de campos e ondas, e electromagnetismo, teoría de circuitos eléctricos, circuitos 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
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. Kirchoff'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	Ordinary class hours	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	Educational exposition, using both slides and blackboard, of the theoretical contents of the subject. Examples.
Laboratory practice	Students will perform laboratory practices for circuit analysis.  The students registered part-time and with academic dispensation of exemption attendance will develop the practices not necessarily on-site, and the submission and defense dates will be adjustable.
Problem solving	Students learn how to formulate and solve representative exercises. They also gather together in small groups in order to share their knowledge and discuss some results.
Mixed objective/subjective test	Exam about the contents of the subject combining theoretical questions with practical exercises.

Personalized attention	
Methodologies	Description
Guest lecture / keynote speech Laboratory practice Problem solving	Guest lecture/keynote speech: To solve questions from the students related to the theoretical concepts introduced during the lectures.  Laboratory practice; To solve questions from the students related to the proposed exercises to be solved in the electronics laboratory with the help of the basic instrumentation equipment.  Problem solving; To solve questions from the students related to the proposed exemplary exercises.  In all cases, communication with the students will take place using the individual tutoring hours, through email, Teams, or by making use of the corresponding Moodle tools. These two last cases will be particularly adequate for those students with with academic dispensation of exemption attendance.  For those students registered part-time the timetable the tutoring hours could be adapted according to needs.

Assessment			
Methodologies	Competencies	Description	Qualification
Laboratory practice	A2 B1 B3 C2 C6	Evaluation of the exercises solved by the student in the electronics laboratory.	20
Problem solving	A2 B1 B3 C2 C6	Evaluation, by means of mixed tests, of the exemplary exercises solved by the student.	40
Mixed objective/subjective test	A2 B1 B3 C2 C6	Final evaluation of the theoretical concepts and problem solving skills.	40

Assessment comments



The evaluation of this subject consists of:

- final exam including theoretical questions and practical exercises,
- practices exam, and.
- problem-solving tests during the lecture period.

The final mark is obtained as follows: Final mark = A + B + C, where:

A = mark corresponding to the final exam (0 to 4),

B = mark corresponding to the laboratory exercises (0 to 2), and

C = mark corresponding to the problem-solving tests (0 to 4).

To pass the course, the following must be fulfilled: final grade higher than or equal to 5, having obtained at least 1 point in the final exam. If such a minimum of 1 point is not obtained, the final grade will be equal to (B+C)/2.

Detection of plagiarism or copying of works: the fraudulent performance of the tests or evaluation activities will directly imply the qualification of failure '0' in the subject in the corresponding opportunity.

In the second opportunity (July) only the final exam can be repeated (A). Marks corresponding to the laboratory exercises (B) and problem-solving tests (C) correspond to those obtained during the lecture period. In this opportunity the student will have at his/her disposal an SGT exam, in addition to the corresponding final exam. In case of taking the additional SGT exam, the grade obtained in the exam will cancel the SGT grade obtained in the first opportunity.

For the Early Assessment Opportunity the same criteria as for the second opportunity will apply.

The evaluation criteria, scoring (see paragraph above), and activities for the students registered part time and with academic dispensation of exemption attendance will be the same as those required for the rest of the students. In this case, the complexity and contents of the evaluations will also be similar to those specified for the rest of the students.

### Sources of information

<b>Basic</b>	- ( ) . . Apuntamentos da materia. Profesores da materia.Circuitos eléctricos. Schaum. J.A.Edminister. Ed. McGraw Hill.Electrónica. Allan R. Hambley. Ed. Prentice HallElectronics. Allan R. Hambley. Ed. Prentice Hall
<b>Complementary</b>	Electricidad Básica. Problemas Resueltos. Julio C. Brégains y Paula M. Castro. Ed. Starbook, ISBN 978-84-15457-25-1, 2012.Electrónica Básica. Problemas Resueltos. Julio C. Brégains y Paula M. Castro. Ed. Starbook, 2012. Introducción al análisis de circuitos. Robert L. Boylestad. Ec. Prentice HallIntroducción al análisis de circuitos. Un enfoque sistémico. Donald E. Scott. Ed. McGraw Hill.Microelectrónica. Circuitos y sistemas analógicos y digitales. Jacob Millman. Ed. Hispano Europea.Circuitos microelectrónicos. Adel S. Sedra y Kenneth C. Smith. Ed. OxfordPrincipios de electrónica. A.P.Malvino. Ed. McGraw-Hill.Electrónica: teoría de circuitos y dispositivos electrónicos. Robert L. Boylestad y Louis Nashelsky. Ed. Prentice Hall.Circuitos electrónicos. Análisis, simulación y diseño. Norbert R. Malik. Ed. Prentice Hall.Circuitos microelectrónicos. Análisis y diseño. M. H. Rashid. Ed. Thomson.

### Recommendations

#### Subjects that it is recommended to have taken before

Computer Science Preliminaries/614G01002

Calculus/614G01003

#### Subjects that are recommended to be taken simultaneously

Fundamentals of Computers/614G01007

#### Subjects that continue the syllabus

Fundamentals of Computers/614G01007

Computer Structure/614G01012

Networks/614G01017

Concurrency and Parallelism/614G01018

Infrastructure Management/614G01025

Hardware Devices and Interfaces/614G01032

#### Other comments

Students in this subject should have a basic knowledge about differential and integral calculus as well as electromagnetism. A sustainable use of the resources and the prevention of negative impacts on the natural environment must be made. It must be taken into account the importance of ethical principles related to the awareness of sustainability values in personal and professional behaviors.

(\*)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.