# UNIVERSIDADE DA CORUÑA

| Teaching Guide | | | | |
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| **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 | | | |
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| **Web** | campusvirtual.udc.es | | | |
| **General description** | Physical principles of semiconductors and logic families. Electronic and photonic devices. Electronic circuits. | | | |
| **Contingency plan** | 1. Modifications in the contents. <br><br> - No changes will be made. <br><br> 2. Methodologies <br> *Teaching methodologies that are maintained <br> - Guest lectures. <br> - Laboratory practices (evaluable). <br> - Problem solving (evaluable). <br> - Mixed test (evaluable). <br><br> *Teaching methodologies that are modified <br> - Additional sessions through Teams: Guest lectures, Problem solving (GRT), Laboratory classes (to solve doubts). <br><br> 3. Mechanisms of personalized attention to the students <br> - Email: Daily. To be used to make inquiries or request virtual meetings for solving doubts. <br> - 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. <br><br> 4. Modifications in the evaluation <br> - No changes will be made. <br> *Evaluation observations: the same mechanism (moodle tests) may be used in the evaluation of the seminars and the mixed test. <br><br> 5. Modifications of the bibliography or webgraphy <br> - No changes will be made. | | | |

# UNIVERSIDADE DA CORUÑA

| Study programme competences | |
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| **Code** | **Study programme competences** |
| 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** | | |
| 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 | | | | |
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| **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 |

| 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 necesarily 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 |
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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 | |
|---|---|
| Basic | - (). .<br><br>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 |
| Complementary | 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 |
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| 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.