



IDENTIFYING DATA

Fundamentals of electronics

Subject	Fundamentals of electronics			
Code	V12G330V01402			
Study programme	Grado en Ingeniería en Electrónica Industrial y Automática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Nogueiras Meléndez, Andres Augusto			
Lecturers	Lago Ferreiro, Alfonso Nogueiras Meléndez, Andres Augusto			
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General description	This subject provides basic knowledge, both theoretical and practical, about the fundamental concepts of analog electronics.			

English Friendly subject: International students may request from the teachers: a) resources and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.

This is a translated version of the subject guide. In case of any discrepancy, the only one valid is the Spanish one.

Skills

Code	
B3	CG3 Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations.
C11	CE11 Knowledge of the fundamentals of electronics.
D2	CT2 Problems resolution.
D9	CT9 Apply knowledge.
D10	CT10 Self learning and work.

Learning outcomes

Expected results from this subject	Training and Learning Results		
Understand the appearances related with the interconnection of basic devices	B3	C11	D2 D9
Understand the operation of the basic electronic devices	B3	C11	D2 D9
Analyse discrete circuits			D2 D9 D10
Analyse and design circuits amplifiers			D2 D9 D10
Use basic electronic instrumentation			D9 D10

Know and dominate the tools of simulation of devices	B3	D2 D9 D10
Check the operation of the electronic circuits		D9 D10

Contents

Topic	
Subject 1. Solid State Physics	Fundamental concepts. Introduction to solid state physics. PN Junction: balance, forward and reverse bias. Differences between an ideal diode and a real diode. Models of the diode. Understanding datasheets. Types of diodes.
Subject 2. Circuits with diodes	Clamping circuit. Limiter circuit. Rectifying circuits. Capacitors as filters.
Subject 3. Transistors.	Bipolar transistor (BJT). Field Effect Transistors (JFET and MOSFET). Models.
Subject 4. Amplification.	Concepts, parameters, classification. Biasing circuits. Small signal models of transistors. Frequency response.
Subject 5. Coupling of Amplifiers.	Capacitor coupling. Direct coupling. Multistage amplifiers. Power amplifiers.
Subject 6. Feedback	Concepts. Influence and advantages of the negative feedback. Types of negative feedback. Impedance dependence on feedback. Oscillators.
Subject 7. Operational Amplifiers.	Concept. Characteristics. Differences between the ideal and the real operational amplifier. Datasheets.
Subject 8. Applications of the Operational Amplifiers.	Linear applications: inverting, non inverting, follower, adder, subtractor, integrator, differentiator. Non linear applications no linear: generators, comparators, rectifiers, clippers, limiters and peak detectors. First order active filters.
Subject 9. Linear Regulated Sources	Concept. Types of regulators: series, parallel. Integrated voltage regulators. Applications.

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	0	1	1
Case studies	0	15	15
Lecturing	23	0	23
Problem solving	15	29	44
Autonomous problem solving	0	27	27
Previous studies	0	20	20
Laboratory practical	15	0	15
Essay questions exam	3	0	3

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

Methodologies

	Description
Introductory activities	Before the lectures, students will be given activities to previously gain the needed skills and knowledge to understand to face the sessions.
Case studies	Before the sessions, students will be given activities to previously gain the needed skills and knowledge to understand the concepts.
Lecturing	They will take place at the times set by the school direction. They will consist of a presentation by the teacher of relevant aspects of the subject that will be related to the subjects that the student previously had to work on. The active participation of the same is encouraged, which will have the opportunity to express doubts and questions during the session.
Problem solving	During lectures, when it is relevant, exercises or examples will be solved to enhance the acquisition of knowledge.
Autonomous problem solving	After all the lectures, the students must spend time studying the given topics. Any doubt or question can be answered or explained at the beginning of the following lecture.
Previous studies	All materials are given in advance, so the students can read them, make a brief analysis and start each lecture or laboratory sessions with some insight of them

Laboratory practical	<p>During the laboratory sessions, students will carry out activities of the following type:</p> <ul style="list-style-type: none"> - Assembly of circuits. - Use and configuration of electronic instrumentation - Measurements on circuits variables - Calculations related to assembly and/or verification of measurements - Collect and represent of acquired data <p>At the end of each laboratory session, each group will deliver to the professor the corresponding result sheets.</p>
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Personalized assistance

Methodologies	Description
Laboratory practical	Tutoring sessions are available, on demand, to have orientation on the topics of the subject.
Autonomous problem solving	Tutoring sessions are available, on demand, to have orientation on the topics of the subject.

Assessment

	Description	Qualification	Training and Learning Results	
Laboratory practical	<p>The practices of laboratory will evaluate of continuous way (session to session). The criteria of evaluation are:</p> <ul style="list-style-type: none"> - A minimum assistance of 80%. - Punctuality. - Previous preparation of the practices. - Proper use of the session for knowledge acquisition. - The practical sessions will be made in groups of two students. The script of the practices will be previously available . - The students will answer on a group of pages the results, that will deliver to the ending of the practice. This report will serve to justify the assistance and evaluate the acquired knowledge 	20	C11	D10
Essay questions exam	<p>It will consist of an individually written examn or a face-to-face oral test at the end of quadmester, or in the schedules established by the direction of the centre.</p> <p>The exams will be a combination of the following types of exercises:</p> <ul style="list-style-type: none"> - Test questions. - Short answer questions - Analytical problems - Resolution of practical cases 	80	B3	C11 D2 D9

Other comments on the Evaluation

To pass the subject, the student must obtain 5 points out of 10.

Recommendations: The students will be able to consult any doubt related to the activities assigned to the work group to which they belong or the matter seen in the face-to-face hours in the tutorial hours or through the media related in the Student Service section.

Students must inexcusably meet the deadlines established for the different activities.

In the different tests, students are advised to justify all the results they achieve.

When scoring them, no result will be given by implication and the method used to reach the proposed solution will be taken into account.

It is recommended, in the presentation of the various exercises, not to present misspellings and illegible characters or symbols, because they will affect the final score.

Pencil cannot be used.

Exams that are missing any of the sheets that accompany the statement will not be corrected.

Notes cannot be used during the tests and mobile phones must be switched off.

Guidelines for improvement and recovery:

In the event that a student does not pass the subject in the first call, they have a second call in the current academic year. The corresponding final grade for this second call will be obtained as a result of adding the following notes:

- 1.- The note obtained in the evaluation of the laboratory practices in the first call, with a weight of 20% of the final grade.
- 2.- The note obtained in the evaluation of the individual and face-to-face written test. The test will evaluate contents of the entire subject. The weight of this grade is 80% of the final grade.

To pass the subject in this second call it is necessary to obtain a final score equal to or greater than 5 points.

After the end of this academic year. the marks obtained in the evaluations of the thematic blocks and the mark obtained in the evaluation of the final exam lose their validity.

The grades obtained in the practical evaluations will be maintained during the two academic years following the current course, unless the student wishes to do them again.

Evaluation of students who waive continuous evaluation:

Students who are officially granted by the center the waiver of continuous assessment, will have to take a written test similar to the long-answer individualized test and a practical laboratory test. Both tests will have a maximum score of 10 points. The final mark will be the average of the marks of the two tests. To pass the course you will have to obtain a grade equal to or greater than 5 points. The written test will be held at the end of the semester, at the times established by the center's management. The practical test on a date close to the previous one and that will be proposed depending on the availability of the laboratories.

Ethical commitment: The student is expected to present appropriate ethical behavior. In the case of detecting unethical behavior (copying, plagiarism, use of unauthorized electronic devices, and others) it will be considered that the student does not meet the necessary requirements to pass the subject. In this case, the overall grade in the current academic year will be a fail (0.0).

Sources of information

Basic Bibliography

Boylestad, R.L., Nashelsky, L., **Electrónica: Teoría de circuitos y dispositivos electrónicos**, 9786073243957, 11ª, Prentice-Hall, 2018

Malik N.R., **Circuitos Electrónicos. Análisis, simulación y diseño**, Prentice-Hall, 1996

Malvino, A; Bates, D., **Principios de Electrónica**, 7º, McGraw-Hill, 2007

Complementary Bibliography

Rashid, M.H., **Circuitos microelectrónicos. Análisis y diseño**, Thomson, 2002

Pleite Guerra, J., Vergaz Benito, R., Ruíz de Marcos, J.M., **Electrónica analógica para ingenieros**, McGraw-Hill, 2009

Hambley, A.R., **Electrónica**, Prentice-Hall, 2001

Millmann, J., **Microelectrónica. Circuitos y sistemas analógicos y digitales**, Hispano Europea, 1988

Coughlin, R.F., Driscoll, F.F., **Amplificadores operacionales y circuitos integrados lineales**, Prentice-Hall, 1999

Recommendations

Subjects that continue the syllabus

Digital electronics and microcontrollers/V12G330V01601

Electronic instrumentation 1/V12G330V01503

Power electronics/V12G330V01701

Industrial electronics/V12G330V01924

Electronic instrumentation 2/V12G330V01921

Subjects that are recommended to be taken simultaneously

Automation and control fundamentals/V12G330V01401

Subjects that it is recommended to have taken before

Physics: Physics 1/V12G330V01102

Physics: Physics 2/V12G330V01202

Computer science: Computing for engineering/V12G330V01203

Mathematics: Calculus 1/V12G330V01104

Mathematics: Calculus 2 and differential equations/V12G330V01204

Basics of circuit analysis and electrical machines/V12G330V01303

Other comments

It is highly advisable that if the student wants to enroll into this subject, it has to be enrolled or has passed the subject of all previous quadmesters, especially "Basics of circuit analysis and electrical machines" (V12G330V01303)

Individual communications will be made through the personal email address that appears in the moovi platform profile.

Students must inexcusably meet the deadlines established for the different activities.

In the different tests, students are advised to justify all the achieved results.

It is recommended, in the presentation of the various exercises, in the practice reports and in the exams, not to present misspellings and illegible characters or symbols, because they will affect the final score.

In the same way, the documentation that the students deliver must be done through word processing, spreadsheet, etc., but

it is not valid to do it by hand and scan or photograph.

Hand notes cannot be used during the exams, and mobile phones must be turned off and put away at all times.