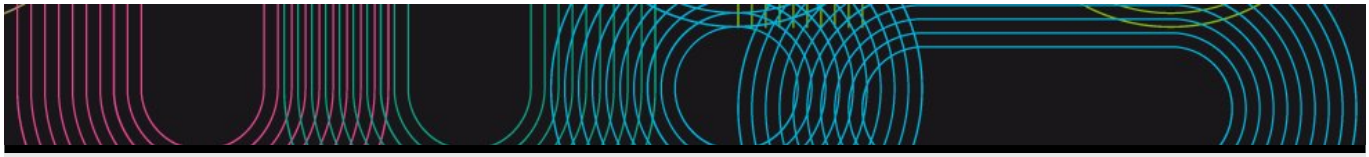

IDENTIFYING DATA				
Electronic technology				
Subject	Electronic technology			
Code	V05G301V01206			
Study programme	Grado en Ingeniería de Tecnologías de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Valdés Peña, María Dolores			
Lecturers	Álvarez Ruiz de Ojeda, Luís Jacobo Raña García, Herminio José Valdés Peña, María Dolores			
E-mail	mvaldes@uvigo.es			
Web	http://moovi.uvigo.gal			
General description	This course is dedicated to the utilisation of integrated circuits, in particular operational amplifiers, as well as to the following fields: Electronics of Power, Electrotechnics in the aspects of electrical installations and to the conversion of photovoltaic solar energy and thermal. English Friendly subject: International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.			

Training and Learning Results	
Code	
B13	CG13 The ability to use software tools that support problem solving in engineering.
B14	CG14 The ability to use software tools to search for information or bibliographical resources.
C14	CE14/T9: The ability to analyze and design combinatory and sequential, synchronous and asynchronous circuits and the usage of integrated circuits and microprocessors.
C16	CE16/T11: The ability to use different energy sources, especially photovoltaic and thermal ones, as well as the fundamentals of power electronics and electronics

Expected results from this subject	Training and Learning Results	
To know how to analyse and use circuits with operational amplifiers and with other integrated circuits.	B13 B14	C14
To know the foundations of Electrotechnics.		C16
To know the foundations of the Power Electronics and the basic topologies of the power electronic converters.	B13 B14	C16
Ability to use distinct sources of energy and especially photovoltaic solar energy and thermal solar energy.	B13	C16

Contents	
Topic	
Operational amplifiers and other integrated circuits	Introduction to amplifiers: Aspects of frequency response in amplifiers. Bode diagrams. Principles of operation of an operational amplifier. Application circuits for operational amplifiers. Other integrated circuits of general application.
Power Electronics (I)	Introduction to Power Electronics. Power electronic devices .
Power Electronics (II)	DC power supplies. DC-DC converters.
Power Electronics (III)	Single-phase rectifiers. Single-phase inverters.

Electrotechnics	Electrical installations. Protections.
Photovoltaic and thermal solar energy	Photovoltaic and thermal solar installations. Photovoltaic cells. Photovoltaic panels. Photovoltaic systems of energy conversion.
Laboratory sessions	Assembly and simulation of the most important circuits studied in the different theory topics. Transistor based amplifiers. Linear and nonlinear applications of operational amplifiers. Linear regulators for power supplies. Power devices. DC-DC and DC-AC converters. Photovoltaic solar generator.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	24	24	48
Laboratory practical	22	22	44
Problem solving	12	12	24
Essay questions exam	1.5	10	11.5
Problem and/or exercise solving	1.5	10	11.5
Laboratory practice	2	9	11

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

Methodologies

	Description
Lecturing	The teacher exposes the theoretical contents. This activity is individual. In these activities skills C14 and C16 are developped.
Laboratory practical	They include circuit mounting and testing and computer electronic circuits simulation. Software to be used: ORCAD PSPICE. Some practical classes will also include some web search made by the student, about some technical information about some specific electronic devices used in the practical classes (e.g. some kind of transistors or operational amplifiers). This activity is collective. The students work in teams of two persons in each laboratory position. Through this methodology the competencies C14, C16, B13 and B14 are developed.
Problem solving	The teacher will solve exercises about most of the chapters. This activity is individual. Through this methodology the competencies C14 and C16 are developed.

Personalized assistance

Methodologies	Description
Lecturing	The students may talk to the professor in the office hours published in the course webpage (https://moovi.uvigo.gal/). Questions about the contents of the master classes will be answered in this tutorship time as well as questions about how to prepare their study.
Laboratory practical	The students may talk to the professor in the office hours published in the course webpage (https://moovi.uvigo.gal/). Questions about the contents of the laboratory practices, about how to use the instrumentation or about the implementation of the electronic circuits and the simulation software will be answered in this sessions.
Problem solving	The students may talk to the professor in the office hours published in the course webpage (https://moovi.uvigo.gal/). Questions about the problems or exercises proposed and solved in the classroom will be answered in this tutorship time as well as other problems or exercises that the student can find along the study of the subject.

Assessment

	Description	Qualification	Training and Learning Results
Essay questions exam	They are part of each partial theory exam. The number of tests and the policy are detailed in 'Other comments' section.	35	C14 C16
Problem and/or exercise solving	They are part of each partial theory exam. The number of tests and the policy are detailed in 'Other comments' section.	35	C14 C16

Laboratory practice	They are carried out in the laboratory. They consist of the type of tasks carried out or prepared during the practices of the subject: the practical tests consist of real assembly of circuits, carrying out measurements on them and questions related to those circuits and/or simulation of circuits equal or similar to those studied in the practices and questions related to that simulation.	30	B13 B14	C14 C16

Other comments on the Evaluation

A continuous assessment (CA) procedure is established based on partial theory and laboratory exams, but students can alternatively opt for a global assessment (GA).

Students are considered to opt for CA from the time they attend the first partial exam, whether it is of the theory or laboratory kind. Students will be able to renounce the CA and opt for the GA until the date in which the first partial exam of laboratory practices is carried out (after the first month of the course).

1. Continuous assessment:

Students who opt for the CA modality will have two assessment opportunities, the ordinary and the extraordinary.

1.1 Ordinary exam for continuous assessment:

The CA is divided into a theory part (70% of the final grade) and another of laboratory practical (30% of the final grade). The planning of the different exams will be published in a shared calendar and will be available at the beginning of the semester.

Regarding the theory part:

- The theoretical part of the subject is evaluated through three exams that will be carried out within the schedule assigned to the subject.
- The weight of each exam is 23,33% of the final grade.
- Student passes this part if they obtain a grade greater than or equal to 4 out of 10 in each of the exams.
- The TG (theory grade) is the average of the three partial exams.

Regarding laboratory exams:

- The practical part of the subject is evaluated through two partial exams that are carried out within the class hours assigned to the laboratories.
- The weight of each exam is 15% of the final grade.
- The attendance to the laboratory sessions is mandatory. Students must complete at least 80% of the sessions.
- This part is passed if a grade greater than or equal to 4 out of 10 is obtained in each of the partial exams.
- The laboratory grade LG is the average grade of the two partials.

Final grade (FG):

The final grade of the continuous assessment is obtained as follows:

FG = (TG*0.7 + LG*0.3) if the grades of all the theory and laboratory partials are greater than or equal to 4 points out of 10 and FG is greater than or equal to 5,

FG = min [(TG*0.7 + LG*0.3), 4.9] otherwise.

On the date of the final exam, it will be possible to recover the failed partial exams, both theory and practical.

1.2 Extraordinary Opportunity of CA:

Students who do not pass one or more of the partial exams of the ordinary opportunity can recover them in the extraordinary one.

The final grade is obtained in the same way as that of the ordinary opportunity.

2. Global assessment (GA):

Students who choose GA will have two assessment opportunities, the ordinary and the extraordinary.

In both cases the evaluation will consist of two exams, one of the theoretical part (TG) of the subject with a weight of 70% and another of the laboratory part (LG) with a weight of 30%.

The final grade (FG) of the continuous assessment is obtained as follows:

FG = (TG*0.7 + LG*0.3) if the grades of all the theory and laboratory partials are greater than or equal to 4 points out of 10 and FG is greater than or equal to 5,

FG = min [(TG*0.7 + LG*0.3), 4.9] otherwise.

3. End-of-program call:

The end-of-program assessment will be the same as that described for the global case.

Other comments:

- Any other information/recommendation regarding the organization of the subject will be published on the subject's website.
- During exams, smart electronic devices must be turned off and out of the reach of students.
- Plagiarism is regarded as serious dishonest behavior. If any form of plagiarism is detected in any of the tests or exams, the final grade will be FAIL (0), and the incident will be reported to the corresponding academic authorities for prosecution.

Sources of information

Basic Bibliography

Hambley, A. R., **Electrónica**, 2ª ed. en español, Prentice-Hall,

Hart, D. W., **Electrónica de potencia**, Prentice-Hall,

Quintáns Graña, C., **Simulación de circuitos electrónicos con OrCAD® PSpice®**, 2.ª edición, Marcombo, 2021

Hambley, Allan R., **Electronics**, 2nd ed., Prentice Hall,

Hart, Daniel W., **Power Electronics**, McGraw-Hill,

Complementary Bibliography

Rashid, Muhammad H., **Electrónica de potencia: circuitos, dispositivos y aplicaciones**, Pearson Education,

Reglamento Electrotécnico para Baja Tensión (REBT) e Instrucciones Técnicas Complementarias (ITC),

Schneider Electric España, S.A., **Guía de diseño de instalaciones eléctricas (PDF de uso libre disponible en www.schneiderelectric.es)**, Schneider Electric España, S.A,

Guirado, R., **Tecnología eléctrica**, McGraw-Hill,

AENOR, **Norma UNE 60617 de Símbolos gráficos para esquemas eléctricos**,

Carta, J. A. y otros, **Centrales de energías renovables: Generación eléctrica con energías renovables**, Pearson-UNED,

Quintáns Graña, C., **Simulación de circuitos con OrCAD 16 DEMO**, 1ª ed., Marcombo,

Recommendations

Subjects that it is recommended to have taken before

Physics: Analysis of Linear Circuits/V05G301V01108
Physics: Fundamentals of electronics/V05G301V01201