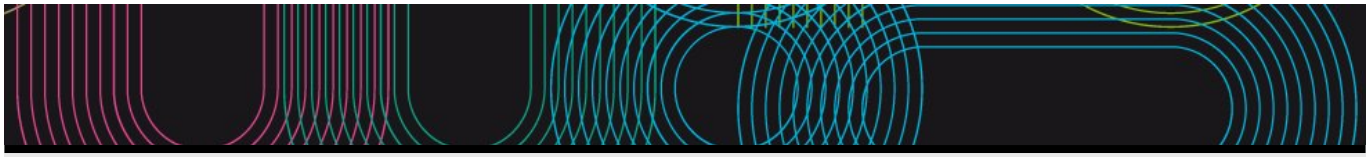

IDENTIFYING DATA				
Electronic Technology				
Subject	Electronic Technology			
Code	V05G300V01401			
Study programme	Degree in Telecommunications Technologies Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	Spanish			
Department				
Coordinator	Raña García, Herminio José			
Lecturers	Pérez Estévez, Diego Quintáns Graña, Camilo Raña García, Herminio José Río Vázquez, Alfredo del			
E-mail	hrana@uvigo.es			
Web	http://faitic.uvigo.es			
General description	This course devotes to the utilisation of integrated circuits, in particular operational amplifiers, as well as to the following fields: Electronics of Power, Electrotechnics in his slope of electrical installations and to the conversion of photovoltaic solar energy and thermal.			

Competencies	
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

Learning outcomes		
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: Appearances 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.

Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	18	18	36
Laboratory practises	22	22	44
Troubleshooting and / or exercises	6	12	18
Short answer tests	3	15	18
Troubleshooting and / or exercises	3	15	18
Practical tests, real task execution and / or simulated.	4	12	16

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

Methodologies

	Description
Master Session	The teachers explain the theoretical contents. Through this methodology the competencies CE14 and CE16 are developed.
Laboratory practises	They include circuit mounting and testing and computer electronic circuits simulation. Some practical clases 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). Through this methodology the competencies CE14, CE16, CG13 and CG14 are developed.
Troubleshooting and / or exercises	The teacher will solve exercises about most of the chapters. Through this methodology the competencies CE14 and CE16 are developed.

Personalized attention

Methodologies	Description
Master Session	The students may attend to the professor office in the tutorship time published in the course webpage. Doubts about the contents of the master classes will be resolved in this tutorship time as well as doubts about how to prepare their study.
Laboratory practises	The students may attend to the professor office in the tutorship time published in the course webpage. Doubts arisen to the students about the practices of laboratory, about how to use the instrumentation or about the implementation of the electronic circuits and the simulation software will be resolved in this sessions.
Troubleshooting and / or exercises	The students may attend to the professor office in the tutorship time published in the course webpage. Doubts arisen to the students on the problems and/or exercises proposed and resolved in the classroom will be resolved in this tutorship time as well as other problems and/or exercises that can appear along the study of the subject.

Assessment

	Description	Qualification	Training and Learning Results
Short answer tests	They make part of each partial examination of theory, in which they are half of its value. The number of tests and how they work are detailed in "Other comments and second call".	35	C14 C16
Troubleshooting and / or exercises	They make part of each partial examination of theory, in which they are half of its value.The number of tests and how they work are detailed in "Other comments and second call".	35	C14 C16
Practical tests, real task execution and / or simulated.	They are made in the laboratory. They consist of the kind of tasks made or prepared during the practices of the course: the practical exams consist of: 1) mounting of circuits, taking measures on them and answering questions related with these circuits and 2) simulation circuits equal or similar to the ones studied in the practices and answering questions related with this simulation. In the examinations of practices of laboratory the student will be allowed to use some especific technical information collected by the student during the practices (eg datasheets from manufacturers).	30	B13 C14 B14 C16

Other comments on the Evaluation

A process of continuous assessment based on midterms is established, but the student may choose alternatively a single assessment in a final exam.

Partialproofs are not recoverable, ie, that if a student can not attend the day they are scheduled, teachers do not have obligation to repeat them. The scores for the partial proofs are valid only for the academic year in which they are made.

Note 1: During exams mobile phones must be turned off and kept away. It is not allowed to use them as calculators. The student must have a calculator.

Note 2: It is not allowed to enter the classroom after an examination begins.

Continuous assessment:

For continuous assessment, the contents of theory are divided into three blocks and the contents of laboratory are divided into two blocks.

It is considered that the student chooses continuous assessment from the moment attending any of the midterms, either theory or practice. In midterms those who do not attend, your note is zero.

The student joins continuous evaluation if and only if he/she attends to any of the partial proofs (either theoretical or laboratory ones) . From that moment, the student is considered as presented, and if he/she doesn't attend to any other partial proof, his/her mark on it will be zero.

As specified below, 4 points (out of 10) is considered as minimum grade in each block, as well as minimum theory mark, laboratory mark or mark of each block (mark of a partial examination or mark of that block in the final examination, in theory or practice, as well).

Regarding theory:

There are two partial proofs, for the first two blocks. The student must repeat each partial proof in the final exam if the mark on any of them is less than 4. The examination of the third block is done by all students in the final proof.

If a student gets a mark of at least 4 points in a partial exam, he/she may try to improve the mark of that block in the final examination, but the mark in that block will be the one obtained in the final exam, even though it is less than the mark obtained in the partial proof.

The theory mark NT is the average mark of the three blocks, if the three student's marks exceed 4 point. If in any of the three blocks, the student does not reach 4 points, his/her theory mark is the minimum between 3.5 and the average of the three blocks.

The partial proofs take place on the usual weekly scheduling of the classes and last 1 hour and 50 minutes each.

They include both one half (in time and in mark) of short answer questions and one half exercises.

Each block of the final theory exam (first, second and third) lasts an hour.

Regarding practices:

Laboratory practices are assessed through practical tests described above (laboratory proofs).

The practices of the two blocks are examined in two partial laboratory proofs. The student must repeat a lab proof in the final exam if his/her mark in it is less than 4.

To participate in the partial proofs of practices of laboratory the student must attend to all the laboratory practical classes. Nevertheless, the students that do not fulfil this requirement can attend to the partial proofs of theory and liberate themselves from its contents for the final examination of theory.
If a student gets a mark of at least 4 points in a partial (lab) exam, he/she may try to improve the mark of that block in the final examination, but the mark in that block will be the one obtained in the final exam, even though it is less than the mark obtained in the partial proof.

The practice note NP is the average mark of the two blocks, if the mark of the student in both partial proof exceed 4 points. If the student doesn't reach 4 points in one of the two blocks, his/her practice note is the minimum between 3.5 and the average of the two blocks.

The only documentation that can, and should, take the student to the practical tests for use during the lab proofs are manufacturer datasheets about the semiconductors used during practices. The student has to gather them to perform the practices.

VERY IMPORTANT: The students who want to attend to the lab final proof of the course must enroll for it, prior to the proof, via the course web (section"Inscripciones"). The teachers of the course will communicate through an announcement on that website a deadline for such preinscription. This preinscription is necessary to schedule the shifts for the lab proof. Only the students who enroll on that date will have right to do the lab proof.

Final mark:

The final mark NF is NT x 0.7 x 0.3 + NP, if NT and NP are both at least 4 points. Otherwise NF is the minimum between 4.5 and NT x 0.7 x 0.3 + NP. NT and NP are calculated as indicated above. The student passes the course in May session if the final mark NF is greater than or equal to 5.

Evaluation by single exam

Students who choose single test evaluation do the same final exam as those other who are assessed by continuous assessment and who have reached the minimum mark in no partial proof. I.e., they have to make all the final examination, both the three blocks of theory and the two blocks of lab practices.

The theory mark NT, the practice mark NP and the final mark NF are calculated in the same way as indicated above, for students assessed by continuous assessment.

Second call

The second call exam consists of two parts:

- A theory proof, 3 hours long. Its mark is NT.

- A laboratory proof, 1 hour 50 minutes long. Its mark is NP.

Unlike the final exam (first call), this proofs are not divided into blocks.

The mark in this second call exam, NR, is NT x 0,7 + NP x 0,3, where NT is the theory proof mark and NP is the laboratory proof mark, provided that NT and NP are both greater or equal to 4 points. Otherwise, the mark in this second call is the minimum between 4.5 and NT x 0,7 + NP x 0,3.

In the second call, all the students may attend to both sections (theory and practice). The rule of highest mark which is compulsory for the total mark of all the courses, will apply in this course also extended to each section; i.e., the theory mark of each student to calculate the mark for the second call will be the highest between the May theory mark and the mark in the second call theory proof. The same for the lab mark.

VERY IMPORTANT: In the same way as stated for the May final proof, the students who want to attend to the second call lab proof must enroll to attend to it, via the course web. The teachers of the course will communicate through an announcement on that website a deadline for such preinscription. This preinscription is necessary to schedule the shifts for the lab proof. Only the students who enroll on that date will have right to do the lab proof.

Sources of information

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

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

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**, Marcombo,

Recommendations

Subjects that continue the syllabus

Analogue Electronics/V05G300V01624
Power Electronics/V05G300V01625

Subjects that it is recommended to have taken before

Physics: Analysis of Linear Circuits/V05G300V01201
Physics: Fundamentals of Electronics/V05G300V01305

Other comments

The student should have good knowledge about the course "Física: Fundamentos de Electrónica"/V05G300V01305 ("Physics: Electronics Fundamentals"/V05G300V01305), in both its theoretical contents as well as in the laboratory practic classes.