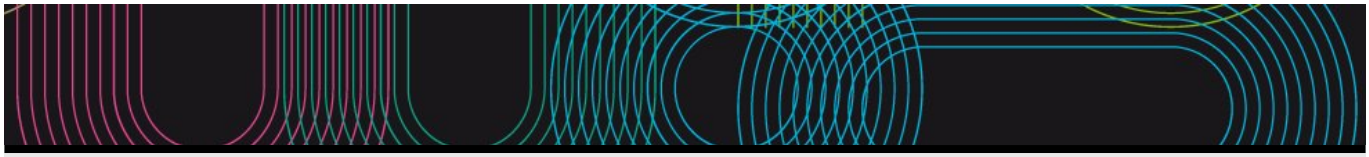

IDENTIFYING DATA				
(*)Electrónica de potencia				
Subject	(*)Electrónica de potencia			
Code	V05G300V01625			
Study programme	(*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	2nd
Teaching language	Galician			
Department				
Coordinator	Doval Gandoy, Jesús			
Lecturers	Doval Gandoy, Jesús Gómez Yepes, Alejandro			
E-mail	jdoval@uvigo.es			
Web	http://faitic.uvigo.es			
General description	The main goal of this subject is to provide students with the knowledge about the basics of power electronics. Contents include power semiconductor devices, AC-DC converters, DC-DC converters, DC-AC converters and basic concepts about the control of these power converters.			

Competencies	
Code	
A52	(CE43/SE5): The ability to design analogical and digital electronics circuits of analogical to digital conversion and vice versa, of radiofrequency, of feeding and electrical energy conversion for computing and telecommunication engineering.
A53	(CE44/SE6): The ability to understand and use feedback theory and electronic control systems.

Learning aims	
Expected results from this subject	Training and Learning Results
Knowledge of the operation of the basic topologies of electronic converters used in conversion of electrical energy.	A52
Capacity to design basic circuits used in power electronic converters.	A52 A53

Contents	
Topic	
Chapter 1: Introduction to power electronics	Introduction, overview of power electronics,l applications.
Chapter 2: Power electronic devices	Diode, MOSFET, IGBT. Switching, drivers, thermal analysis, association of devices, electrical protection.
Chapter 3: Basics of three phase electrical systems	Definition of electrical power under sinusoidal and non-sinusoidal conditions. Power factor, balanced and unbalanced three phase systems, sequence of phases, definition of power three phase systems.
Chapter 4: Magnetics in power electronics	Basics, inductors, transformers, magnetic materials.
Chapter 5: AC to DC power conversion	Three phase rectifiers. Non-controlled rectifiers, controlled rectifiers. Resistive load, inductive load, capacitive filter. Input AC Introduction to the power factor correction.
Chapter 6: DC to DC power conversion	Basic DC to DC converter topologies. Converters without isolation and with isolation. Control in DC to DC power converters.
Chapter 7: DC to AC power conversion	Basics of DC to AC power conversion. Single phase and three phase inverters. Square wave inverters, PWM inverters. Modulation techniques.

Laboratory exercise 1. Power electronic semiconductor devices.	MOSFET transistor, switching characteristics. Current and voltage characteristics.
Laboratory exercise 2. AC to DC power conversion	Non-controlled three phase rectifier, controlled three phase rectifier. Input/ output current and voltage.
Laboratory exercise 3. DC to DC power conversion	Non-isolated and isolated DC to DC converter. Input/ output current and voltage.
Laboratory exercise 4. DC to AC power conversion	DC to AC converter. Input/ output current and voltage.

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practises	9	18	27
Integrated methodologies	7	21	28
Master Session	21	42	63
Troubleshooting and / or exercises	5	27	32

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

Methodologies

	Description
Laboratory practises	Practical application of the theoretical concepts.
Integrated methodologies	Proposal of problems and/or exercises related with the subject contents. Students have to obtain the correct solutions. The professor will support and will help students to solve the problems.
Master Session	Presentation by the professor of the contents on the subject, guidelines for the work to develop by the student.

Personalized attention

Methodologies	Description
Master Session	The professor will assist students about their doubts and queries related to the study of theoretical concepts, problems or laboratory exercises. Students will have opportunity to attend personal tutorials in the professor□s office, in the hours established for this purpose at the beginning of the academic year.
Laboratory practises	The professor will assist students about their doubts and queries related to the study of theoretical concepts, problems or laboratory exercises. Students will have opportunity to attend personal tutorials in the professor□s office, in the hours established for this purpose at the beginning of the academic year.
Integrated methodologies	The professor will assist students about their doubts and queries related to the study of theoretical concepts, problems or laboratory exercises. Students will have opportunity to attend personal tutorials in the professor□s office, in the hours established for this purpose at the beginning of the academic year.

Assessment

	Description	Qualification
Troubleshooting and / or exercises	Each exam is composed by exercises and problems related to the theoretical concepts and laboratory practices. The number of exams and examination rules are detailed in "Other comments"	100

Other comments on the Evaluation

In this subject there are two ways to evaluate to the students: continuous evaluation or evaluation by final examination.

1. Continuous evaluation.

Consists in the execution of weekly tasks and the realisation of tests of partial evaluation.

1.1 Weekly tasks: weekly, the professor will commission to the students the execution of tasks and the delivery of the report of execution. To be able to approve the subject by continuous evaluation is compulsory to realise and deliver the reports in the term fixed by the professor. These tasks will evaluate the competencies A52 and A53.

1.2 Tests of partial evaluation: students will realise three written tests of partial evaluation. The partial tests are not recoverable, that is, if a student can not attend the test, professors do not have obligation to repeat them. The qualifications of the partial tests will be valid only for the current academic year. It is understood that students choose continuous evaluation if they attend any of the partial tests. Their qualification will be the one of continuous evaluation. These tests will

evaluate the competencies A52 and A53.

1st partial test: it will be held during the last 50 minutes of the first laboratory session. Students will be evaluated of the contents taught to date of the test. Students will be able to obtain in this test until 25% of the final qualification. This test will be held about week 7.

2nd partial test: it will be held during the last 50 minutes of the first laboratory session. Students will be evaluated of the contents taught to date of the test. Students will be able to obtain in this test until 25% of the final qualification. This test will be held about week 11.

3rd partial test: it will be held during 60 minutes in the date and classroom of the final examination.. Students will be evaluated of the contents taught to date of the test. Students will be able to obtain in this test until 50% of the final qualification. This test will be held on a date chosen by the Dean of the Faculty (date final examination).

2. Evaluation by final examination

The final examination evaluates students that did not participate in the continuous evaluation. Consists of theoretical questions, problems and exercises. Students attending final examination, who did not submit the reports of partial tasks, have the obligation to deliver a report including all the partial tasks proposed along the course. This test will be held during 2 hours on a date chosen by the Dean of the Faculty. This final examination will evaluate the competitions A52 and A53.

3. Extraordinary examination (June-July)

Consists of theoretical questions, problems and exercises. Students attending final examination, who did not submit the reports of partial tasks, have the obligation to deliver a report including all the partial tasks proposed along the course. This test will be held during 2 hours on a date chosen by the Dean of the Faculty. This final examination will evaluate the competitions A52 and A53.

Sources of information

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

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

Mohan, N., **Power electronics : converters, applications, and design**, John Wiley & Sons,

Barrado, A., **Problemas de electrónica de potencia**, Pearson Prentice Hall,

Recommendations

Subjects that it is recommended to have taken before

(*)Física: Análise de circuítos lineais/V05G300V01201
(*)Física: Campos e ondas/V05G300V01202
(*)Física: Fundamentos de mecánica e termodinámica/V05G300V01102
(*)Electrónica dixital/V05G300V01402
(*)Física: Fundamentos de electrónica/V05G300V01305
(*)Tecnoloxía electrónica/V05G300V01401
(*)Circuítos electrónicos programables/V05G300V01502