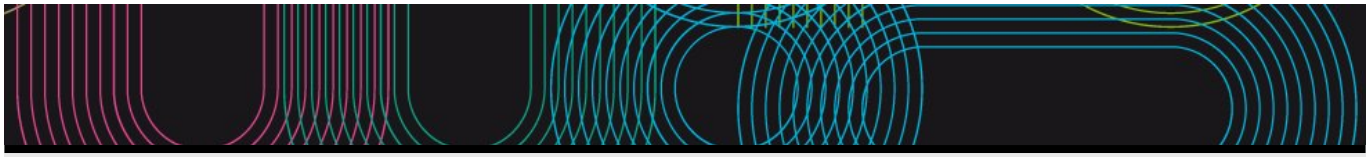

IDENTIFYING DATA				
Photovoltaic Power Electronics				
Subject	Photovoltaic Power Electronics			
Code	V05M145V01330			
Study programme	Telecommunication Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Optional	2nd	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Doval Gandoy, Jesús			
Lecturers	Doval Gandoy, Jesús			
E-mail	jdoval@uvigo.es			
Web	http://faitic.uvigo.es			
General description	The subject describes the basic concepts of control and power electronic converters used in photovoltaic systems.			

Competencies	
Code	
A2	CB2 Students must apply their knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
B4	CG4 Capacity for mathematical modeling, calculation and simulation in technological centers and engineering companies, particularly in research, development and innovation tasks in all areas related to Telecommunication Engineering and associated multidisciplinary fields.
B8	CG8 Ability to apply acquired knowledge and to solve problems in new or unfamiliar environments within broader and multidiscipline contexts, being able to integrate knowledge.
C28	CE28/SE1 Capacity of technology integration of photovoltaic conversion for power systems of Telecommunication Engineering.

Learning outcomes	
Expected results from this subject	Training and Learning Results
Knowledge of power conversion technologies used in photovoltaic systems.	A2 B4 B8 C28
Knowledge of control techniques of electronic power converters used in photovoltaic systems.	A2 B4 B8 C28

Contents	
Topic	
Chapter 1: Introduction to photovoltaic systems	Photovoltaic effect. Electrical characteristics of photovoltaic cells. Temperature dependence. Irradiation dependence. Electrical connection. Shadow effect.
Chapter 2: Topologies of power electronics converters in photovoltaics.	Electrical configuration photovoltaic cells. Topologies of power electronics converters.
Chapter 3: Control of photovoltaic inverters.	Control of stand-alone photovoltaic inverters. Control of grid-connected photovoltaic inverters. Synchronisation. Maximum power point tracking.
Chapter 4: Regulations and Standards in power electronics photovoltaics systems.	International regulations: IEEE, IEC, VDE, EN. Power quality, ride-through, anti-islanding.

Planning			
	Class hours	Hours outside the classroom	Total hours
Laboratory practises	10	31	41
Troubleshooting and / or exercises	5	16	21
Master Session	15	48	63

*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	Application of the knowledge to particular situations and acquisition of basic skills related with the topic. Competencies: CB2, CG4, CG8, CE28/SE1.
Troubleshooting and / or exercises	Formulation of problems and/or exercises related with the topic. The student has to develop the correct solutions by means of applying routines, the application of formulas or algorithms, the application of procedures of transformation of the available information and the interpretation of the results. Competencies: CB2, CG4, CG8, CE28/SE1.
Master Session	The professor presents the contents on the subject: theoretical basis and/or guidelines of the work to be developed by the students. Competencies: CB2, CG4, CG8, CE28/SE1.

Personalized attention	
Methodologies	**Description**
Master Session	The professor will attend personally doubts and queries of the students, on the study of theoretical concepts, on exercises or on practices of laboratory. The students will have occasion to attend personal tutorials at the professor office. The tutorial hours will be published at the beginning of the semester in the website of the subject.
Laboratory practises	The professor will attend personally doubts and queries of the students, on the study of theoretical concepts, on exercises or on practices of laboratory. The students will have occasion to attend personal tutorials at the professor office. The tutorial hours will be published at the beginning of the semester in the website of the subject.
Troubleshooting and / or exercises	The professor will attend personally doubts and queries of the students, on the study of theoretical concepts, on exercises or on practices of laboratory. The students will have occasion to attend personal tutorials at the professor office. The tutorial hours will be published at the beginning of the semester in the website of the subject.

Assessment					
	Description	Qualification	Training and Learning Results		
Laboratory practises	Development of the practices of laboratory.	33	A2	B4 B8	C28
Troubleshooting and / or exercises	Resolution of exercises proposed	33	A2	B4 B8	C28
Master Session	Theoretical concepts.	34	A2	B4 B8	C28

Other comments on the Evaluation

There are two ways to evaluate the students: continuous evaluation or evaluation by final examination.

1. Continuous evaluation

The continuous evaluation consists in the evaluation of the tasks proposed by the professor along the course. The students will execute the tasks and will deliver a report of each one of the tasks. The students will present the tasks in the classroom and they will have to answer quesions.

The professor will score the students from their work in the developed tasks, the reports and the oral presentation.

The marks will be valid only for the current academic course. It is understood that the student chooses the continuous assessment when it presents at least one task. His qualification will be the one of continuous evaluation.

2. Evaluation by final examination

The final examination is for students that do not participate in the continuous evaluation. It consists of theoretical questions, problems and exercises that will evaluate the knowledge of the student in the topic. The examination date will be established by the head of the Faculty.

3. Extraordinary examination (June-July)

The extraordinary examination of theoretical questions, problems and exercises that will evaluate the knowledge of the student in the topic. The examination date will be established by the head of the Faculty.This examination is the same for all the students, have followed or no the continuous evaluation.

Sources of information

Basic Bibliography

Remus Teodorescu, Marco Liserre, Pedro Rodríguez, **Grid Converters for Photovoltaic and Wind Power Systems**, John Wiley & Sons, Ltd.,

Complementary Bibliography

Ned Mohan, Tore M. Undeland, William P. Robbins, **Power Electronics: Converters, Applications, and Design**, John Wiley & Sons, Ltd.,

Andrés Barrado Bautista, Antonio Lázaro Blanco, **Problemas de electrónica de potencia**, Pearson Educación,

Recommendations