



## IDENTIFYING DATA

### Power electronics

Subject	Power electronics			
Code	V12G330V01701			
Study programme	Degree in Industrial Electronics and Automation Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	4th	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Martínez-Peñalver Freire, Carlos			
Lecturers	López Sánchez, Óscar Martínez-Peñalver Freire, Carlos			
E-mail	penalver@uvigo.es			
Web	http://fatic.uvigo.es			
General description	The aim that pursues with this *asignatura is that the *alumnado purchase the foundations of the electronics of power and the knowledges for the design of the electronic converters connected to the electrical network and his applications, so much from the theoretical point of view like practical.			

## Competencies

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.
B4	CG4 Ability to solve problems with initiative, decision making, creativity, critical thinking and the ability to communicate and transmit knowledge and skills in the scope of industrial engineering in the field of Industrial Electronic and Automation.
C22	CE22 Applied knowledge of power electronics.
C24	CE24 Ability to design analog, digital and power electronic systems.
D2	CT2 Problems resolution.
D6	CT6 Application of computer science in the field of study.
D9	CT9 Apply knowledge.
D17	CT17 Working as a team.

## Learning outcomes

Expected results from this subject	Training and Learning Results		
Understand the operation of the devices of power, his shot and his turned off.	B3	C22 C24	D2 D9
Comprise the basic appearances for the protection of the devices of power.		C22	D2 D9
Understand the basic operation of the conversion of electrical energy with electronic converters of power	B4	C22	D2 D6 D9
Purchase skills on the process of simulation of electronic converters of power.			D6 D9 D17

## Contents

Topic
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INTRODUCTION	- Generalities. - Semiconductors of power and characteristic of control.
ELECTRONIC COMPONENTS OF POWER	- Diodes of power. - Bipolar transistors, *MOSFET and *IGBT of power. - Thyristors. Shot and blockade
CONVERTERS *CA/CC	- Rectification no controlled. - Association of teams *rectificadores. - Rectification controlled.
CONVERTERS *AC/*AC	- Static switches of *AC. - Regulatory of alternating current.
CONVERTERS CC/*CA	- Static investors: Introduction. - Control of the tension. - Converters CC/*CA commutated *PWM with transistors. - Investors with thyristors.
CONVERTERS CC/CC	- Converters CC/CC with thyristors

## Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	0	1	1
Case studies	0	25	25
Lecturing	23	0	23
Problem solving	12	12	24
Autonomous problem solving	0	28	28
Previous studies	0	25	25
Laboratory practical	15	0	15
Self-assessment	0	6	6
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	With *antelación to the start of the face-to-face sessions will be to disposal of the students a listing detailed of knowledges that owe to purchase along his previous training and that will be him necessary to face the matter successfully.
Case studies	With *antelación to the realisation of the theoretical sessions, the students will have of a series of matters that have to prepare, as on them *versarán said sessions.
Lecturing	They will develop in the schedules fixed by the direction of the centre. They will consist in an exhibition by part of the professor of notable appearances of the matter that will be related with the matters that previously had to work the student. In this way favourable the active participation of the same, that will have occasion to expose doubts and questions during the session.
Problem solving	They will develop in the schedules fixed by the direction of the centre. When it result timely or notable will proceed to the resolution of examples and/or problems that illustrate properly the problematic to treat.
Autonomous problem solving	After each theoretical session of classroom the student would have to realise, of systematic form a study of consolidation and review where would have to remain resolved all his doubts with respect to the matter. The doubts or unsolved appearances will have to expose them to the professor to the greater shortness, so that this use these doubts or questions like element of *realimentación of the process of education-learning.
Previous studies	It is absolutely indispensable that, for one correct *aprovechamiento, the student realise a previous preparation of the practical sessions of laboratory, for this will supply him indications and specific material for each session with *antelación sufficient. The student will have to work previously on the material supplied and also has to have prepared the necessary theoretical appearances to tackle the session. This previous preparation will be an element that will have very in account to the hour to evaluate each practical session.
Laboratory practical	During the sessions of practices the students will realise activities of the following type: - Setting of circuits. - I handle of electronic instrumentation - Measured on circuits - relative Calculations to the setting and/or measures of *comprobación - Compilation and representation of data At the end of each session of practical each group will deliver the leaves of corresponding results.

## Personalized assistance

Methodologies	Description
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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"> <li>- A minimum assistance of 80%.</li> <li>- *Puntualidad.</li> <li>- Previous preparation of the practices.</li> <li>- *Aprovechamiento Of the session.</li> <li>- The practical sessions will realise in groups of two students. The billed of the practices will be the disposal of the students with *antelación.</li> <li>- The students answered in a group of leaves the results, that will deliver to the ending of the practice. These leaves will serve to justify the assistance and value the *aprovechamiento.</li> </ul>	20	C22	D6 D17
Essay questions exam	<p>It will consist in a proof written of individual and face-to-face character that will realise when finalising the *cuatrimestre, in the schedules established by the direction of the centre.</p> <p>The proof will be able to consist in a combination of the following types of exercises:</p> <ul style="list-style-type: none"> <li>- you Question type test.</li> <li>- Questions of short answer.</li> <li>- Problems of analysis.</li> <li>- Resolution of practical cases.</li> </ul>	80	B4 C22 C24	D2 D6 D9

#### Other comments on the Evaluation

To surpass the \*asignatura, the student has to obtain 5 points on 10.

#### Recommendations:

The students will be able to consult any relative doubt to the activities assigned to the group of work to the that belong or the matter seen in the face-to-face hours in the hours of \*tutorías or through the means related in the section of Attention to the student.

The students have to fulfil \*inexcusablemente the terms established for the different activities.

In the different proofs advises to the students that justify all the results that reach. To the hour to mark them will not give any result by \*sobreentendido and will take into account the method employed to arrive to the solution proposed.

It recommends , in the presentation of the diverse exercises, not presenting faults of spelling and characters or unreadable symbols, because they will affect the final punctuation.

During the realisation of the final examination the mobile telephones will have to be turned off, and, only in the case that authorise previously, will be able to use aim, computers or another material of support.

#### Guidelines for the improvement and the recovery:

In case that a student do not approve the matter in the first announcement, has of a second announcement in the present academic course. The corresponding final qualification for this second announcement will obtain like result to add the following notes:

- 1.- The note obtained in the evaluation of the practices of laboratory in the first announcement, with a weight of 20% of the final qualification.
- 2.- The note obtained in the evaluation the evaluation of the thematic blocks with the same \*contextualización that in the first announcement. The weight of this note is of 20% of the final qualification.
- 3.- The note obtained in the evaluation of the final examination realised in this announcement with the same \*contextualización that in the first announcement. The weight of this note is of 60% of the final qualification.

To approve the matter in this second announcement is necessary to obtain an equal final punctuation or upper to 5 points.

Once finished the present academic course the note obtained in the evaluation of the final examination loses his validity. The notes obtained in the evaluations of practices and of the thematic blocks will keep during the two academic courses following to the present course, except that the student wish to do them again.

#### Evaluation of students with renunciation to the evaluation continued:

The students that was them conceded, of official form by the centre, the renunciation to the evaluation continued, will have to realise a proof written similar to the proof \*individualizada of long answer and a practical proof of laboratory.

Both proofs will have a maximum punctuation of 10 points. The final note will be the average of the notes of the two proofs. To surpass the \*asignatura will have to obtain an equal or upper note to 5 points. The proof written will realise when finalising the \*cuatrimestre, in the schedules established by the direction of the centre. The practical proof in a near date to

the previous and that will propose in function of the availability of the laboratories. ethical  
Commitment: \*Espérase that or present  
student a \*comportamento ethical \*axeitado. No case to detect a \*comportamento  
\*non ethical (copy, \*plaxio, utilisation of electronic devices \*non authorised,  
and \*outros) \*considerarase that or student \*non gather you necessary requirements to  
surpass to matter. \*Neste Case to global qualification no present academic course  
will be of suspense (0.0).

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#### **Sources of information**

##### **Basic Bibliography**

M.H. Rashid, **ELECTRÓNICA DE POTENCIA: CIRCUITOS, DISPOSITIVOS Y APLICACIONES**, 2004,

D.W.Hart, **ELECTRÓNICA DE POTENCIA**, 2001.,

S. Martínez García y J.A.Gualda Gil., **ELECTRÓNICA DE POTENCIA: Componentes, topologías y equipos**, 2006,

E. Ballester y R. Piqué, **ELECTRÓNICA DE POTENCIA: Principios fundamentales y Estructuras Básicas.**, 2011,

N. Mohan, T.M. Undeland, W.P. Robbins., **POWER ELECTRONICS: CONVERTERS, APPLICATIONS AND DESIGN.**, 2003,

##### **Complementary Bibliography**

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#### **Recommendations**

##### **Subjects that continue the syllabus**

Industrial electronics/V12G330V01924

Final Year Dissertation/V12G330V01991

##### **Subjects that are recommended to be taken simultaneously**

Electronic instrumentation 2/V12G330V01921

Real-time control systems/V12G330V01913

##### **Subjects that it is recommended to have taken before**

Fundamentals of electronics/V12G330V01402

Digital electronics and microcontrollers/V12G330V01601

Three-phase systems and electrical machines/V12G330V01505

Digital electronic systems/V12G330V01923

##### **Other comments**

To enrol in this \*asignatura is necessary to have surpassed or be enrolled in all the matters of the inferior courses to the course in that it is situated this \*asignatura.