COURSE DATA

Data Subject	
Code	44289
Name	Electronic devices
Cycle	Master's degree
ECTS Credits	2.0
Academic year	2020 - 2021

Study (s)

Degree	Center	Acad. year	Period
2199 - M.D. in Electronic Engineering	School of Engineering	1	First term

Subject-matter

Degree	Subject-matter	Character
2199 - M.D. in Electronic Engineering	3 - Industrial electronic	Obligatory

Coordination

Name	Department
JORDAN MARTINEZ, JOSE FRANCISCO	242 - Electronic Engineering

SUMMARY

This is a course of specialization in the various electronic devices found in industrial systems. It aims to give a practical view of the use of both passive devices such as semiconductor devices in industrial systems.

It is taught as a compulsory subject in the Master of Electrical Engineering from the University of Valencia, during the first quarter.

The total teaching load is 2 ECTS. Corresponding to 20 student contact hours and 30 hours of individual work.

The purpose of this course is to introduce students to the different both passive semiconductor devices found in industrial systems. Different devices, their spec sheets, the terminology used in its parameters and finally applying them in different industrial systems based on these features will be displayed.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

The background needed to properly follow the subject are taught in the basic subjects of basic electronics. In particular knowledge of electronic components and circuits.

OUTCOMES

2199 - M.D. in Electronic Engineering

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Take into account the economic and social context in engineering solutions, be aware of diversity and multiculturalism and ensure sustainability and respect for human rights and equality between men and women.
- Diseñar un sistema, componente o proceso que cumpla unas especificaciones desde diferentes puntos de vista: electrónico, económico, social, ético y medioambiental.
- Demostrar una comprensión sistemática de un campo de estudio y el dominio de las habilidades.
- Realizar un análisis crítico, evaluación y síntesis de ideas nuevas y complejas.
- Ser capaz de fomentar, en contextos académicos y profesionales, el avance tecnológico, social o cultural dentro de una sociedad basada en el conocimiento.
- Capacidad para proyectar, calcular y diseñar productos, procesos e instalaciones en todos los ámbitos de la Ingeniería Electrónica y en particular los de tratamiento de la señal, sistemas digitales y de comunicaciones y electrónica industrial.
- Capacidad para el modelado matemático, cálculo y simulación en todos los ámbitos relacionados con la Ingeniería Electrónica y campos multidisciplinares afines. En especial los de tratamiento de la señal, sistemas digitales y de comunicaciones y electrónica industrial.
- Identificar, formular y resolver problemas de los sistemas electrónicos industriales.

- Ability to specify, implement, document and set-up electronics, instrumentation and control equipment and systems, considering both technical aspects and the relevant regulatory requirements.

LEARNING OUTCOMES

After completing the course the student should be able to:

1. Perform design electronic subsystems considering the power electronic devices available on the market.

2. Predict conduction losses and switching power converters.

3. Troubleshooting switching power devices.

DESCRIPTION OF CONTENTS

1. The power diode.

1. The power diode.
1.1. Types of power diodes.
1.1.1. Rectifiers.
1.1.2. Fast diodes.
1.1.3. SiC diodes.
1.2. Static characterization.
1.3. Dynamic characterization.
1.4. Design and dimensioning of power diodes.
1.4.1. Leaves features.
1.4.2. Diode design.

2. Power MOSFET

2. Power MOSFET.
2.1. Types of power MOSFET
2.1.1. Individual devices.
2.1.2. MOSFET Modules.
2.2. Static characterization.
2.3. Dynamic characterization.
2.4. Thermal characterization.
2.5. Design and dimensioning of MOSFET.
2.5.1. Leaves features.
2.5.2. Design with MOSFET.

3. Power IGBT

3. Power IGBT.
3.1. Types IGBT power
3.1.1. Individual devices.
3.1.2. IGBT modules.
3.2. Static characterization.
3.3. Dynamic characterization.
3.4. Thermal characterization.
3.5. Design and dimensioning IGBT.
3.5.1. Leaves features.
3.5.2. IGBT design.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	10,00	100
Laboratory practices	10,00	100
Development of group work	5,00	0
Study and independent work	10,00	0
Readings supplementary material	5,00	0
Preparing lectures	5,00	0
Preparation of practical classes and problem	5,00	0
TOTAL	**50,00**	

TEACHING METHODOLOGY

The teaching methods employed in the development of the course are:

a) Theoretical activities.

Expository development of matter with the student's participation in the resolution of specific issues.

b) Practical activities.

Solving practical problems

c) Student's personal work.

Description: Performing outside the classroom to issues and problems as well as the preparation of classes and exams (study). This task will be performed individually and try to promote self-employment.

We will use e-learning platforms (LMS) to support communication with students. Through it the student will have access to course materials used in class, as well as solving problems and exercises.

EVALUATION

The evaluation of the course will be conducted by performing a test that will take the form of an individual examination or group work about the contents of the subject.

REFERENCES

Basic

- Apuntes de la asignatura.
- J.M. PETER "The power Transistor in its enviromment" Thomson Publ. 1979
- MOHAN, UNDELAND, ROBBINS "Power Electronics" J. Wiley 1995

Additional

- M. RASHID "Power Electronics" Prentice.Hall 1995
- R. TARTER "Solid-State Power Conversion Handbook" J. Wiley 1993

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

In the event of a closure of the facilities due to the health situation that totally or partially affects the classes of the subject, these will be replaced by non-face-to-face sessions following the established schedules. If the closure affects any face-to-face assessment test of the subject, it will be replaced by a test of a similar nature that will be carried out in virtual mode through the tools with institutional support from the University of Valencia. The percentages of each evaluation test will remain unchanged, as established by this guide.