VNIVERSITAT DE VALÈNCIA

Course Guide
46797 Energy Conversion and Electromobility

COURSE DATA

DATA SUBJECT

Code: 46797
Name: Energy Conversion and Electromobility
Cycle: Doctorate / Master's Degree
ECTS Credits: 4.5
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
2269 - Master's Degree in Electronic Engineering	Escola Tècnica Superior d'Enginyeria	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
2269 - Master's Degree in Electronic Engineering	Electrónica Industrial	COMPULSORY

COORDINATION

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SUMMARY

It is a subject that reviews two important parts of industrial electronics, on the one hand the energy conversion systems and on the other electromobility from the point of view of the different energy converters that are used in electromobility

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

It is convenient to know the basic circuits of power converters.

COMPETENCES / LEARNING OUTCOMES

2269 - Master's Degree in Electronic Engineering

Conduct a critical analysis, evaluation and synthesis of new ideas to solve problems in complex or unfamiliar environments within broader contexts in the field of electronic engineering and related multidisciplinary fields.

Create mathematical models and simulations in the field of electronic engineering and related multidisciplinary fields.

Demonstrate a systematic knowledge and a mastery of technical, personal, social and methodological skills in the field of electronic engineering and related multidisciplinary fields.

Design systems and processes that meet electronic, regulatory, economic, social, ethical and environmental specifications.

Gain the professional skills and cooperation abilities that are suitable for practising in the field of electronic engineering and related multidisciplinary fields.

Handle specialised software and hardware, as well as design, simulation and programming environments in the field of electronic engineering and related multidisciplinary fields.

Identify, formulate and solve problems in the field of electronic engineering and related multidisciplinary fields.

Interpret technical documentation and regulatory standards for equipment and systems in the field of electronic engineering and related multidisciplinary fields.

Know advanced techniques of energy conversion, electromagnetic compatibility and system control in the field of industrial electronics.

Project, calculate and design products, processes and installations in the field of electronic engineering and related multidisciplinary fields.

DESCRIPTION OF CONTENTS

1. Introduction

1.1.- Introduction to energy conversion
1.2.- Introduction to electromobility
1.3.- Introduction to devices and magnetic components

2. Power convertion

2.1.- Electronic power devices
2.2.- New materials for SiC and GaN devices
2.3.- Basic topologies of converters.
2.4.- Sensors, isolation and divers.
2.5.- Control and HMI of converters
2.6.- Magnotid components

3. Electromobility

3.1.- Embarked and not embarked devices. Different housings, modules and discreet
3.2.- Systems and subsystems in electromobility
3.3.- Basic topologies of electromovility subsystems.
3.4.- Sensors, isolation and divers.
3.5.- Control and HMI of converters in electromobility.
3.6.- Communication between subsystems

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	20,00
Laboratory	25,00
Total hours	**45,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	22,50
Independent study and work	30,00
Preparation of lessons	0,00
Preparation for assessment activities	15,00
Resolution of case studies	0,00
Total hours	**67,50**

TEACHING METHODOLOGY

The teaching methodologies to be used in the development of the subject are the following:

a) Theoretical activities.

Development of the subject by providing a global and integrative vision, analyzing in greater detail the key and greater complexity aspects, promoting, at all times, the participation of students.

b) Practical activities.

Theoretical activities complement the objective of applying the basic concepts and expanding them with the knowledge and experience they are acquiring during the proposed works. In general, they will be held in a group, to enhance students' team work skills. They comprise the following types of activities:

b.1)- Laboratory practices: a series of laboratory sessions are proposed that, following a sequencing analogous to the theoretical contents, immediately put into practice the knowledge acquired. This strategy offers two clear benefits: on the one hand, fundamental concepts are better settle and, on the other, students are developed naturally and progressively.

B.2)- Discussion sessions and resolution of practical cases previously worked by students.

EVALUATION

The learning evaluation will be carried out through the following evaluation systems (SE):

*First call:

For students who demonstrate continuous and effective participation in the proposed activities, as well as a minimum assistance of 80% of the face -to -face sessions, the evaluation of their learning will be carried out as follows:

SE2 - Evaluation of practical activities: realization of the individual questionnaire and/or resolution of a practical case in the laboratory similar to those that have been resolved in the practical sessions taught: 50%

SE3 - Continuous evaluation: Delivery of technical reports or results reports, as well as work and/or project: 50%

Students who have not demonstrated continuous and effective participation in the proposed activities or have not attended at least 80% of the face-to-face sessions, must carry out a theoretical-practical final exam or individual evaluation questionnaire in the classroom with the presence of the teacher from which the final note will come out (SE1 + SE2, both parts with the same weight).

*Second call:

The evaluation will be carried out through a theoretical-practical final written test from which the final note (SE1+SE2) will come out.

Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the

ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020).

In any case, the system of evaluation will be ruled by the established in the Regulation of Evaluation and Qualification of the University of Valencia for Degrees and Masters.

(https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?accion=inicio&idEdictoSeleccionado=5639).

REFERENCES

- Mohan, Undeland, Robbins.: Power Electronics. Converters, applications and design. Ed John Wiley & Sons. Inc, 2o edición. 1995
- M. H. Rashid., Electrónica de Potencia: Circuitos, dispositivos y aplicaciones, 3a edición, Prentice-Hall Hispanoamericana, 2003
- J.G. Kassakian, M.F. Schlecht, G.C. Verghese., Principles of Power Electronics, Ed. Addison-Wesley, 1991
- A. Barrado. Problemas de electrónica de potencia. Prentice Hall 2008