

29621 - Power Electronics

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	430 - Bachelor's Degree in Electrical Engineering
ECTS	6.0
Year	3
Semester	First semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The course will be based on combining theoretical explanations with practical exercises and laboratory work.

- Lectures will provide theoretical background on fundamentals of power electronics.
- Case studies and real applications will be worked out at the classroom.
- The students will do laboratory work in small groups, building, testing and analyzing power electronic circuits.
- Individual and group assignments will be proposed.

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- Student participation is considered very important in order to acquire the learning outcomes and skills needed.

5.2.Learning tasks

Classroom activities 2.4 ECTS (60 hours)

1) Course lectures (T1) (30 hours).

The fundamentals of power electronics including essential background concepts are presented and illustrated with real examples.

2) Case studies (T2) (15 hours)

Different case studies will be worked out at the classroom. Students are encouraged to prepare them in advance. Assignments could also be worked out in this part.

3) Laboratory work (T3) (15 hours).

Five laboratory sessions will be carried out. Each session will be evaluated in the laboratory. Students have to prepare sessions in advance.

personal work: 3.6 ECTS (90 hours)

4) Assignments (T6) (4 hours)

Individual and group assignments will be proposed

5) Personal study (T7) (82 hours)

Continuous study will be promoted among students. They can also attend tutorials to solve the specific problems they can face in the course

6) Evaluation activities (T8) (4 hours)

Assessment will be based on coursework (laboratory work and assignments) and final examination

5.3.Syllabus

- * Introduction to power electronics
- * Power Converter Topologies
 - AC-DC converters (rectifiers)
 - DC-DC converters.
 - DC-AC converters (inverters)

- CA-CA converters
- Resonant Converters: generalities
- * Power Semiconductor Devices
- Diode, SCR, TRIAC, GTO
- BJT, MOSFET, IGBT
- Other power electronic devices
- * Introduction to microcontroller-based power electronic control

5.4.Course planning and calendar

Timetables for classroom and laboratory sessions will be published prior to the beginning of the course at the web of the EINA <https://eina.unizar.es/> and EUPT <https://eupt.unizar.es/>

5.5.Bibliography and recommended resources

[BB: Bibliografía básica / BC: Bibliografía complementaria]

- [BB] Hart, Daniel W.. Electrónica de potencia / Daniel W. Hart ; traducción, Vuelapluma ; revisión técnica, Andrés Barrado Bautista...[et al.] . - 1a. ed. en español Madrid [etc.] : Prentice-Hall, D.L. 2001
- [BB] Mohan, Ned. Power electronics : converters, applications and design / Ned Mohan, Tore M. Undeland, William P. Robbins . - 3rd. ed. [New York] : John Wiley & Sons, cop. 2003
- [BC] Erickson, Robert W.. Fundamentals of power electronics / Robert W. Erickson, Dragan Maksimovic . - 2nd ed., 6th print. New York : Springer, 2004
- [BC] Kassakian, John G.. Principles of power electronics / John G. Kassakian, Martin F. Schlecht, George C. Verghese Reading,Massachusetts : Addison-Wesley, cop. 1991
- [BC] Krein, Philip T.. Elements of power electronics / Philip T. Krein Oxford ; New York : Oxford University Press, 1998
- [BC] Problemas de electrónica de potencia / coordinación y revisión técnica Andrés Barrado Bautista, Antonio Lázaro Blanco Madrid [etc.] : Pearson Educación, D.L. 2007
- [BC] Rashid, Muhammad H.. Electrónica de potencia : circuitos, dispositivos y aplicaciones / Muhammad H. Rashid ; traducción, Virgilio González Pozo ; revisión técnica, Agustín Suárez Fernández [y] Miguel Angel González del Moral . - 3ª ed. México [etc.] : Pearson Educación, 2004

Listado de URL

- Transparencias (apuntes) de la asignatura, enunciados de problemas y guiones de prácticas de laboratorio. Disponibles en <http://moodle.unizar.es>. [<http://moodle.unizar.es>]