

29621 - Power Electronics

Syllabus Information

Academic Year: 2021/22

Subject: 29621 - Power Electronics

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

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

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

- Lectures will provide a theoretical background on the fundamentals of power electronics.
- Case studies and real applications will be worked out in 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.
- Student participation is considered very important in order to acquire the learning outcomes and skills needed.

4.2. Learning tasks

The course includes the following 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 in 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.

Autonomous 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

4.3. Syllabus

The course will address the following topics:

- ? 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

4.4. 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/>

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=29621&Identificador=14504>