

## 29621 - Power Electronics

### Syllabus Information

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**Academic Year:** 2019/20

**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

### 1.1.Aims of the course

### 1.2.Context and importance of this course in the degree

### 1.3.Recommendations to take this course

## 2.Learning goals

### 2.1.Competences

### 2.2.Learning goals

### 2.3.Importance of learning goals

## 3.Assessment (1st and 2nd call)

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

## 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://psfunizar7.unizar.es/br13/egAsignatura>