

## 60819 - Power and Digital Electronics

### Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	532 - Master's in Industrial Engineering
ECTS	6.0
Course	1
Period	First semester
Subject Type	Optional
Module	---

### 1.Basic info

#### 1.1.Recommendations to take this course

#### 1.2.Activities and key dates for the course

### 2.Initiation

#### 2.1.Learning outcomes that define the subject

#### 2.2.Introduction

### 3.Context and competences

#### 3.1.Goals

#### 3.2.Context and meaning of the subject in the degree

#### 3.3.Competences

#### 3.4.Importance of learning outcomes

### 4.Evaluation

### 5.Activities and resources

#### 5.1.General methodological presentation

The learning-teaching process turns around three basic activities: classroom sessions, problem sessions and experimental validation at the laboratory.

- At the classroom session the theoretical fundamentals of the course will be explained. This explanations will turn around actual application examples.

- During the problem sessions students will solve cases and problems related to the subject

## **60819 - Power and Digital Electronics**

- Laboratory sessions are organized in small groups and students will build and test the operation of several electronic circuits.

### **5.2.Learning activities**

#### **IN-PERSON ACTIVITIES: 2.4 ECTS (60 hours)**

##### **1) Classroom activities (type T1) (15 hours)**

Theoretical and practical contents will be explained. The lecturer will show the fundamentals and basic concepts of the course. Application cases will drive these explanations, raising concrete milestones to be achieved.

##### **2) Problem and case-solution activities (type T2) (30 hours)**

This activity will turn around the problems and issues raised from the achievement of each milestone. The solution of these problems and any related work will be carried out in groups.

##### **3) Laboratory work (type T3) (15 hours)**

Students will implement and test the experimental validity of the solutions developed during classroom and problem activities.

#### **NOT IN-PERSON ACTIVITIES: 3.6 ECTS (90 hours)**

##### **4) Demanded works (type T6) (25 hours)**

Students must compute, analyse and organize all the data and knowledge required for a successful achievement of the Laboratory session.

##### **5) Self-study (type T7) (60 hours)**

Personal work of each student in order to achieve a comprehensive knowledge of the concepts and methods required on the achievement of the milestones of the course.

##### **6) Assessment activities (type T8) (5 hours)**

## 60819 - Power and Digital Electronics

The assessment activities allow to evaluate the degree of achievement of the student and additionally students get a feedback of the level of their skills and knowledge in the field of the course.

### 5.3.Program

#### General topics:

- Fundamentals of microcontrollers
- Design of microcontroller-based electronic systems
- Fundamentals of power electronics
- Power conversion: DC-DC, DC-AC, AC-AC and AC-DC
- Fundamentals of power electronics technology

#### Laboratory sessions :

- Introduction to microcontroller-based design
- Speed variation of a motor using a PWM generated by a microcontroller
- Simulation and experimental implementation of a DC-DC converter
- Simulation and experimental show of an inverter.
- Thyristor-based control of the luminosity of an incandescent lamp.

### 5.4.Planning and scheduling

Classroom and laboratory activities will be held according to the timetable published by the Faculty of Engineering.

The lecturer will inform about the timing of the tutorship sessions.

Other activities will be planned according to the number of students and will be published in <http://moodle.unizar.es>

### 5.5.Bibliography and recommended resources

- 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
- Floyd, Thomas L.. Fundamentos de sistemas digitales / Thomas L. Floyd ; traducción Vuelapluma ; revisión técnica Eduardo Barrera López de Turiso . - 9ª ed. Madrid [etc.] : Pearson Educación, D. L. 2006
- Van Sickle, T. Programing Microcontrollers in C / T. Van Sickle. 2nd ed. Newnes, 2001
- 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
- Problemas de electrónica de potencia / coordinación y revisión técnica Andrés Barrado Bautista, Antonio Lázaro Blanco . - [Reimp.] Madrid [etc.] : Pearson Educación, D.L. 2012