

28826 - Power Electronics

Syllabus Information

Academic year: 2023/24

Subject: 28826 - Power Electronics

Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia

Degree: 424 - Bachelor's Degree in Mechatronics Engineering

ECTS: 6.0

Year: 3

Semester: Second semester

Subject type: Compulsory

Module:

1. General information

The general objective of the subject is to provide the necessary knowledge to interpret and solve electronic circuits of power control, especially in the areas of static switches, rectifiers, rectifiers, regulators and power inverters.

This requires the correct use of the most common computer applications to obtain information on power components and their applications, and also the correct interpretation of the technical documentation of the components used, as well as the computer applications for circuit simulation.

The correct use of the measuring and power supply devices commonly used in the electronics laboratory must also be achieved, as well as the correct interpretation of the measurements taken.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), so that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to their achievement:

- Goal 7: Ensure access to affordable, secure, sustainable and modern energy.

2. Learning results

- Interpret and solve analog and digital electronic circuits.
- Acquire programming skills in μP .
- To know sensor and transducer typologies.
- Master simulation tools and basic laboratory instruments.
- Understand and interpret commercial equipment documentation.
- Drawing and interpreting planes and diagrams according to the appropriate standards and symbology.

3. Syllabus

Introduction to power electronics

Electronic power amplifiers

- AC-DC converters (rectifiers)
- DC-DC converters
- DC-AC (inverter) and AC-AC converters

Power electronic devices

- Power diodes and thyristors
- Power transistors
- Other power devices

Introduction to stage control (PWM)

4. Academic activities

- Theoretical classes: The theoretical concepts of the subject will be explained and the following practical examples will be developed.
- Types of problems: The teacher solves problems or case studies for illustrative purposes. This type of teaching complements the theory presented in the lectures with practical aspects.
- Tutored problem solving: Students will develop examples and carry out problems or case studies related to the theoretical concepts studied.
- Laboratory Practices: The total group of theory classes may or may not be divided into smaller groups, as appropriate. Students will perform assemblies, measurements, simulations, etc. in the laboratories in the presence of the practical

teacher.

- Tutored autonomous activities: These activities will be tutored by the teachers of the subject.
- Reinforcement activities: Through Moodle, various activities will be conducted to reinforce the basic contents of the subject. Its performance will be monitored through the same.

5. Assessment system

The subject is divided into two thematic blocks, which will be evaluated as following:

1. Laboratory practices (30%): In each of the practices, the dynamics followed for its correct execution and operation will be evaluated. It will be assessed whether the required data are correct and has been correctly answered to the questions posed, as well as the quality of the analysis that the students carry out of the results obtained.
2. Theoretical-practical written tests (70%) in which questions and/or problems of similar complexity to those used during the term will be posed. The quality and clarity of resolution, the concepts used to solve the problems, absence of errors, and the correct use of terminology and notation will be evaluated.

In order to pass the subject, in each of the practical blocks and the theoretical-practical written tests that will be carried out, students must obtain a grade equal to 4 to pass the subject.

The final grade will be the average of the grades obtained in each of the blocks. **NOTE = (Block1)-50%+ (Block2)-50**

The student will be able to choose between a continuous assessment, carried out in the form of two written tests and the delivery of the scripts of practices throughout the term, or a global test carried out at the end of the term corresponding to the written tests and/or a global test corresponding to the practices of laboratory. This global test will be divided into two parts corresponding to the blocks of the subject, the student must achieve a minimum grade of 4 points in each of them to average.

It is an indispensable condition to pass the subject in continuous assessment, the attendance to 80% of the face-to-face activities: classes, technical visits, practices, etc.

The grades obtained in each of the blocks may be promoted to the next session/s within the same academic year, provided that the grade is equal to 4 points.