

29826 - Electronic Instrumentation

Syllabus Information

Academic year: 2024/25

Subject: 29826 - Electronic Instrumentation

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

326 - Escuela Universitaria Politécnica de Teruel

Degree: 440 - Bachelor's Degree in Electronic and Automatic Engineering

444 - Bachelor's Degree in Electronic and Automatic Engineering

ECTS: 6.0

Year: 3

Semester: Second semester

Subject type: Compulsory

Module:

1. General information

In order to follow Electronic Instrumentation it is recommended to take at the same time (or to have taken) **Programmable Electronic Systems** and to have sufficient knowledge of **Fundamentals of Electronics, Analog Electronics and Signals and Systems**.

The objective of this subject is to train the student in the design of electronic systems that measure, record and process physical quantities for the field of industrial electronics. The student will learn to build and implement electronic circuits with sensors and signal conditioning circuits. The aim is to achieve analytical and design skills.

2. Learning results

- Recognize typical industrial electronics sensors and build signal conditioning circuits.
- Understand the actual characteristics of amplifiers and design amplifiers for sensor applications.
- Understand the problems associated with electromagnetic noise and know how to deal with it in a basic way.
- Design simple passive and active filters for low and mid frequency instrumentation applications.
- Know the electronic implementation of A/D and D/A converter circuits and know how to choose the most suitable one for each application.
- Know the blocks and circuits of data acquisition boards, know how to choose the right board for each application and build complete data acquisition systems.
- Understand the operation of the most typical measuring instruments used in industrial electronics.

3. Syllabus

The contents to be developed are the following (some of them will be developed in the theory classes, others in the problem classes and others in the laboratory practices):

1. Data acquisition systems
2. A/D and D/A converters
3. Filters for instrumentation
4. Sensor fundamentals
5. Sensor signal conditioning circuits
 - Analog conditioning circuits
 - Amplifiers
 - Basic concepts of noise and interferences
6. Sensors for industrial applications

4. Academic activities

- **Participative lectures (30 hours).**
- **Problem classes (15 hours).**
- **Practices (15 hours):** the student will design, analyze, simulate, assemble and test acquisition circuits using sensors. Each practice requires prior preparation at home.
- Personal study and work (84 hours).
- Assessment (6 hours).

At EUPT, the degree is offered in two different modalities: on-site and blended learning. The above applies to the classroom. In blended learning, the learning activities will be: Problems, Lab practicals and Assignments, Study, Evaluation and Virtual

tutorials. Some practices require physical presence.

5. Assessment system

Global assessment through the following activities:

- **Practices (40% of the final grade).** Practices are graded in the laboratory session (prior preparation and student work) and/or by examination. Failure to attend a practice at the scheduled time implies a grade of 0 in that session. Whoever does not achieve a minimum of 4 out of 10 in the total of the practical part of the subject, will have to pass an oral individual laboratory exam within the framework of the official call. The minimum grade required is 4 out of 10 points.
- **Written exam (60% of the final grade).** With theoretical/practical questions and problems. A minimum of 4 out of 10 points are required.

Final grade (if the indicated minimum is reached in both parts) = $0.6 \cdot \text{Exam} + 0.4 \cdot \text{Practices}$. If the minimum is not reached in any of the parts, the final grade will be the lower of 4.0 and the weighted grade.

At EUPT, the degree is offered in classroom and blended modalities. In the blended learning, the practices and evaluable activities will be adapted to this format. Some laboratory practices require physical presence.

6. Sustainable Development Goals

- 8 - Decent Work and Economic Growth
- 9 - Industry, Innovation and Infrastructure