

## 30047 - Electronic Instrumentation

### Syllabus Information

**Academic year:** 2024/25

**Subject:** 30047 - Electronic Instrumentation

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 436 - Bachelor's Degree in Industrial Engineering Technology

**ECTS:** 6.0

**Year:** 4

**Semester:** Second semester

**Subject type:** Optional

**Module:**

### 1. General information

This subject is linked to 30047

The concepts are studied so that, from a physical magnitude to be measured, this information can be transformed into processable information

### 2. Learning results

**The student, in order to pass this subject, must demonstrate the following results...**

- Is able to select the ideal architecture of an electronic instrumentation system.
- Masters the design of the most suitable conditioning circuits for a given sensor, evaluating the effect of their non-idealities on the final measurement result.
- Knows the main sources of interference and their suppression and can apply noise elimination techniques in an electronic system
- Is able to characterize a given instrumentation system by evaluating the effect of its non-idealities on the final measurement result
- Knows the performance of the available analogue-to-digital and digital-to-analogue converters, being able to size and select the most suitable one from the instrumentation point of view
- Identifies the elements that constitute a virtual instrument being able to describe the characteristics of the most widespread instrumentation buses
- Is able to determine the suitability of a commercial measuring instrument for a given application based on a range of specifications and needs
- Masters the use of commercial instrumentation tools to solve practical problems.
- Is able to operate proficiently in the laboratory with real instrumentation systems.

### 3. Syllabus

The contents to be developed are the following (some will be developed in the theory classes, others in the problem classes, others in the practical classes and others in the evaluable activities):

1. Introduction to data acquisition systems
2. Adaptation circuits
  1. Amplification in instrumentation
  2. Filters
  3. Noise and interference
  4. Other circuits
3. Industrial application sensors
  4. Laboratory instrumentation and other systems

### 4. Academic activities

FACE-TO-FACE WORK: 2.4 ECTS (60 hours)

- 1) Classroom (type T1) (30 hours).

Lectures on theoretical and practical contents. The concepts and fundamentals of electronic instrumentation systems will be presented and illustrated with real examples. Student participation will be encouraged.

## 2) Problem classes and case solving (T2 type) (15 hours).

Problems and cases will be developed with the participation of the students, coordinated with the theoretical contents. The student is encouraged to pre-work the problems. Part of these hours may be dedicated to the evaluable learning activities that are specified in each year.

## 3) Practices (type T3) (15 hours).

The student will design, analyse, simulate, assemble and test the operation of data acquisition circuits and sensors. They will have a script of the practice, which they will have to prepare beforehand. Each practice will be graded in the session itself.

NON-FACE-TO-FACE WORK: 3.6 ECTS (90 hours)

## 4) Teaching assignments (type T6) (20 hours).

Activities that the student will perform alone or in groups and that the teacher will be proposing throughout the teaching period. In this subject each student will carry out the activities and works that will be proposed during the term.

## 5. Assessment system

### DURING THE TEACHING PERIOD

Practical part of the subject (practices and evaluable activities, 40%)

- The practices will be graded in the session itself and/or by means of an exam. The previous preparation, the development of the session and the ability to assemble and set up the circuits and programs will be valued. A student who fails to attend a session at the scheduled time will receive a grade of 0 for that session.
- In order to encourage continuous work, evaluable activities may be carried out throughout the teaching period, consisting of group work, individual deliverable exercises, etc. The specific activities to be performed will be communicated in class and on Moodle .
- The set of practices and evaluable activities will account for a total of 40% of the overall grade of the subject. To pass the subject a minimum grade of 4 out of 10 must be obtained in the whole; the student who does not reach this minimum will be summoned to an exam in the laboratory within the framework of the global tests of the official calls.

### GLOBAL TEST (OFFICIAL CALLS, 100%)

The student's global evaluation will be carried out in the official calls. Those who have passed the practical part of the subject in the teaching period (set of practices and evaluable activities), are only required to take the final exam.

1) Final Exam (60%). Composed of theoretical-practical questions and problems, it will account for 60% of the overall grade. To pass the subject a minimum grade of 4 out of 10 must be obtained.

2) Test on the practical part of the subject (practices and evaluable activities, 40%). Intended for students who have not achieved a grade of 4 out of 10 in the practices+activities set during the teaching period (and who have obtained more than 4 out of 10 in the final exam). The configuration of this test will be indicated in due time, and may consist of to perform a practical or individual work in the laboratory with oral presentation, a written exam or any other format. To pass the subject minimum grade of 4 must be obtained.

## 6. Sustainable Development Goals

- 9 - Industry, Innovation and Infrastructure
- 11 - Sustainable Cities and Communities
- 12 - Responsible Production and Consumption