

## 28827 - Electronic Instruments

### Syllabus Information

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**Academic Year:** 2019/20

**Subject:** 28827 - Electronic Instruments

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

**Degree:** 424 - Bachelor's Degree in Mechatronic Engineering

**ECTS:** 6.0

**Year:** 3

**Semester:** Second semester

**Subject Type:** Compulsory

**Module:** ---

## 1.General information

### 1.1.Aims of the course

The main goal of the Electronic Instrumentation course is to train the student in the theoretical and practical concepts of all the blocks that are part of the measurement of a physical variable integrated as part of a measurement system.

The subject and its expected results respond to the following approaches and goals:

- Know how to develop the essential blocks that make up a measurement system of a certain physical variable, and the classification of the Instrumentation systems, according to the measurement type.
- Know how to apply mathematical knowledge to calibrate and calculate measurement errors
- Acquire knowledge about the different types of most frequently used sensors.
- Distinguish the technological, structural and functional characteristics to be able to choose the sensor type, circuits of signal conditioning, acquisition system and the most suitable signal processing, to obtain a certain solution.
- Know the principles of data conversion between the analog and digital domain.
- Encourage students to develop real application projects.

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

Each subject of the career, tries to cover a field in the Technological and Scientific formation of the student. Electronic instrumentation creates the base of knowledge in measurement and monitoring systems that constitute one of the fundamental part of the current mechatronic systems and implies a sizeable impact on the acquisition of the competences of the degree. For this reason, it is reinforced in the fourth year with an optional subject called Advanced Instrumentation, in order to provide useful additional training in the performance of Mechatronic Engineer's functions related to the field of the electronic instrumentation and control.

### 1.3.Recommendations to take this course

There is no prerequisite to take this subject. Nevertheless, the contents to be taken will require the contest of the abilities and skills acquired, mainly, in the subjects of Basic Physics II, Computer Science, Electrical Engineering and Electronic Technology I.

## 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 methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

1. Lectures: The theoretical concepts of the subject are explained and illustrative examples are developed as a support to the theory when necessary, focus on calculation, design and development of a mechatronic system
2. Laboratory Workshop. These classes are highly recommended for a better understanding of the concepts because those items whose calculation is done in theory classes are shown in working mode.
3. Tutorials related to any concept of the subject. This activity is developed in an on-site mode with a defined schedule or through the messaging and forum of the virtual classroom Moodle.

### 4.2.Learning tasks

The course includes the following learning tasks:

- Lectures. it will take 2 hours per week till the 40 hours, necessary to accomplish the objectives of the subject study, will be reached
- Laboratory Workshop. it will take 10 sessions of 2 hours duration. The group is divided up into various groups, according to the laboratory capacity.
- Autonomous work and study. This off-site part is valued in about 90 hours, necessary for the study of theory, problem solving and revision of documents
- Individual tutorials. Each teacher will publish a schedule of attention to the students throughout the four-month period

### 4.3.Syllabus

The contents are distributed in seven teaching units forming treatment indivisible blocks. These topics collect the contents needed for the acquisition of predetermined learning outcomes.

<b>Topic I</b>	<b>Introduction to instrumentation systems.</b>
<b>Topic II</b>	<b>Signal conditioning circuits.</b>
<b>Topic III</b>	<b>Temperature Measurement.</b>
<b>Topic IV</b>	<b>Measurement of position, displacement and velocity.</b>
<b>Topic V</b>	<b>Measurement of strain, strength, weight and torque.</b>
<b>Topic VI</b>	<b>Measurement of acceleration, vibration and shock.</b>
<b>Topic VII</b>	<b>measurement of flow, level and pressure of fluids.</b>

### 4.4.Course planning and calendar

Schedule of Face-to-face generic activities and presentation of papers

The dates of the final exams will be those that are officially published at <https://eupla.unizar.es/asuntos-academicos/examenes>

In continuous evaluation methodology, the students delivering several partial works and a final work whose schedule will be defined during the course.

\* The final dates will be published in the digital platform (moodle)

The overall test for not continuous evaluation system will be set at the end of the semester and will consist of a written test based on theoretical arguments and problems of all topics covered in class.

### 4.5.Bibliography and recommended resources

[http://biblos.unizar.es/br/br\\_citas.php?codigo=28827&year=2019](http://biblos.unizar.es/br/br_citas.php?codigo=28827&year=2019)

<b>Material</b>	<b>Soporte</b>
Topic theory notes Topic presentations	Paper/repository

Topic theory notes Topic presentations Topic problems Related links	Digital/Moodle E-Mail
technical manuals	Paper/repository Digital/Moodle