

## 30115 - Materials Engineering

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 30115 - Materials Engineering

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

**Degree:** 425 - Bachelor's Degree in Industrial Organisational Engineering

**ECTS:** 6.0

**Year:** 2

**Semester:** First semester

**Subject type:** Compulsory

**Module:**

### 1. General information

The main objective of the subject is to provide students with knowledge of the concepts and technical aspects related to materials and applications in the field of engineering.

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/>), in such a way that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to their achievement: 4.4 By 2030, significantly increase the number of young people and adults who have the necessary skills, in particular technical and vocational skills, to access employment, decent work and entrepreneurship

### 2. Learning results

- To know the fundamentals of the science, technology and chemistry of materials commonly used in engineering.
- To understand the relationships between microstructure and macroscopic properties of materials.
- To know how to apply knowledge of science, technology and chemistry to the choice and behavior of metallic, ceramic, polymeric and composite materials.
- To know how to perform material tests.

### 3. Syllabus

#### **THEORETICAL CONTENTS:**

UNIT 1. TECHNOLOGICAL MATERIALS. PROPERTIES.

UNIT 2. MECHANICAL PROPERTIES, TESTING AND FATIGUE.

UNIT 3. ELECTRICAL, MAGNETIC AND OPTICAL PROPERTIES.

UNIT 4. METALLIC MATERIALS. HEAT TREATMENTS.

UNIT 5. CERAMIC MATERIALS.

UNIT 6. POLYMERIC MATERIALS.

UNIT 7. COMPOUND OR HYBRID MATERIALS.

UNIT 8. CORROSION AND WEAR.

#### **PRACTICAL CONTENTS:**

BLOCK I. Determination of mechanical characteristics. Destructive testing: Tensile strength in metals, polymers and composites.

Resilience. Hardness

BLOCK II. Material properties. Inspection, Metallography. Ultrasonic inspection. Extensometry.

### 4. Academic activities

**Lectures:** These are lectures on theoretical arguments and problem solving given in an expository way by the teacher.

**Practical classes:** Activities of theoretical discussion or resolution of exercises and exposition of practical cases by the students.

**Laboratory practices:** Practical activities carried out in the laboratories under the tutoring of the subject's teachers, which will be followed by autonomous activities by the students.

**Individual tutoring:** They may be face-to-face or through the virtual teaching portal (Moodle) or the University of Zaragoza's e-mail.

## 5. Assessment system

### Global continuous assessment.

**Individual work:** This activity will be materialized in the realization of a report on a Final Application assignment that will include a presentation with exhibition and discussion of the same, in class and directed to their peers (15% of the grade, minimum 5 out of 10).

**Laboratory practices:** In each of the practices, the results and conclusions obtained and the process followed will be evaluated. Once the practices has been completed, an individual report of them is handed in. The final grade will be the arithmetic mean. (15% of the grade, minimum 5 out of 10).

**Written evaluation tests:** There will be 3 tests consisting of the typical written exam (theory and problems). The final grade for this activity will be given by the arithmetic mean of these tests, provided that there is no unit grade below 4 points, in which case the activity will be failed (70% of the grade, minimum 5 out of 10).

### Global final assessment.

**Individual work:** The student will deliver a report on the individual work of final application (10% of the grade, minimum 5 out of 10).

**Laboratory practices:** The student will deliver a report of all the practices (carried out during the term). Of these practices will respond in writing to questions posed by the teacher (10% of the grade, minimum 5 out of 10).

**Written examination:** It will consist of a test containing questions and problems related to the topics explained throughout the subject (80% of the grade, minimum 5 out of 10).