

## 29810 - Materials Engineering

### Syllabus Information

**Academic Year:** 2020/21

**Subject:** 29810 - Materials Engineering

**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:** 2

**Semester:** First semester

**Subject Type:** Compulsory

**Module:** ---

## 1.General information

### 1.1.Aims of the course

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

### 1.3.Recommendations to take this course

## 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

**Learning is based on the following activities:**

On-site: Lectures, group discussion, open discussion in the classroom, problem-solving, case analysis, laboratory sessions in small groups.

Autonomous activities: Reading and viewing of written documents and multimedia material, the study of theory and individual problem-solving. Individual or reduced size group preparation of small academic products.

### 4.2.Learning tasks

**The course includes the following learning tasks:**

**Escuela de Ingeniería y Arquitectura (Zaragoza):**

**Lectures (30 on-site hours)**

Theory topics will be developed sequentially in the classroom through the following methods:

Discussion and clarification by the instructor of those concepts included in the readings and previous material that the students show to not have fully understood. Those parts in which students have especial difficulty will be explained together with open discussions in order to integrate the different concepts of the course.

**Problems and case resolution (15 on-site hours)**

Problems will be relative to Materials Engineering, with special emphasis on those in Electronics and Automation Engineering, as well as cases of materials selection within the same technological context.

#### **Laboratory practice (15 in laboratory hours)**

##### School of Engineering and Architecture (Zaragoza)

Laboratory work, distributed approximately as two-hour sessions, will cover the following topics:

- Mechanical tests. Treatment of experimental data obtained in the laboratory.
- Mechanical and thermal treatments of alloys.
- Thermal properties of materials.
- Electrical properties of materials.
- Magnetic properties of materials.

##### University Polytechnic School (Teruel)

- Mechanical tests. Processing of experimental laboratory data. Experimental determination of mechanical properties of materials through different techniques.

#### **Assignments (10 outside class hours)**

##### **Autonomous work and study (78 outside class hours)**

It will include the autonomous work of the student with respect to reading and viewing of the provided material, available in the Course Management System, as well as the study of theory and problem-solving.

##### **Evaluation (5 in class hours)**

#### **Escuela Universitaria Politécnica de Teruel (EUPT):**

##### **Lectures (30 on-site hours)**

Theory topics will be developed sequentially in the classroom through the following methods:

Discussion and clarification by the instructor of those concepts included in the readings and previous material that the students show to not have fully understood. Those parts in which students have especial difficulty will be explained together with open discussions in order to integrate the different concepts of the course.

##### **Problems and case resolution (18 on-site hours)**

Problems will be relative to Materials Engineering, with special emphasis on those in Electronics and Automation Engineering, as well as cases of materials selection within the same technological context.

##### **Laboratory practice (12 in laboratory hours)**

Laboratory work, distributed approximately as two-hour sessions, will cover the following topics: Mechanical tests; Processing of experimental laboratory data; Experimental determination of mechanical properties of materials through different techniques.

##### **Assignments (20 outside class hours)**

The assignment task will include, among others, the analysis and discussion of the properties of different materials, as well as the consideration of the different experimental techniques used for their determination.

##### **Autonomous work and study (65 outside class hours)**

It will include the autonomous work of the student with respect to reading and viewing of the provided material, available in the Course Management System, as well as the study of theory and problem-solving.

##### **Evaluation (5 in class hours)**

### **4.3.Syllabus**

This course will address the following topics:

- A1. Atomic organization in solids: Crystalline structure.
- A2. Defects and diffusion: Microstructure.
- A3. Mechanical properties.
- A4. Phase diagrams and phase transformations.
- B1. Metallic materials.
- B2. Ceramic materials.
- B3. Polymer materials.
- B3. Composite materials.
- C1. Thermal properties.
- C2. Electrical properties.
- C3. Magnetic properties.
- C4. Optical properties.

### **4.4.Course planning and calendar**

- Three on-site hours per week.

- Approximately once every two weeks, the student will attend a laboratory session.
- Key dates and deadlines for additional activities (assignments, additional exams) during the lecturing period will be published in due advance.

#### **4.5. Bibliography and recommended resources**