

## 29810 - Materials Engineering

### Información del Plan Docente

<b>Academic Year</b>	2018/19
<b>Subject</b>	29810 - Materials Engineering
<b>Faculty / School</b>	110 - Escuela de Ingeniería y Arquitectura 326 - Escuela Universitaria Politécnica de Teruel
<b>Degree</b>	440 - Bachelor's Degree in Electronic and Automatic Engineering 444 - Bachelor's Degree in Electronic and Automatic Engineering
<b>ECTS</b>	6.0
<b>Year</b>	2
<b>Semester</b>	First semester
<b>Subject Type</b>	Compulsory
<b>Module</b>	---

### **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:**

In class: Lectures, group discussion, open discussion in the classroom, problem solving, case analysis, laboratory practicals in small groups.

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

### 4.2.Learning tasks

#### Lectures (30 in class hours)

The subjects along the learning units 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 manifest not have been sufficiently comprehended. Lecturing in formal way of those parts in the learning units having especial difficulty together with open discussions in order to integrate the different concepts of the course.

#### Problems and case solving (15 in class hours)

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

#### Laboratory practicals (12 laboratory hours)

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

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

- Mechanical tests. Treatment of experimental data obtained in the laboratory.
- Mechanical and thermal treatments of metals.
- Thermal properties: Thermal expansion in metals and thermal shock in ceramics.
- Electrical properties of conductors, semiconductors and dielectrics.
- Magnetic properties of selected materials.
- Optical transmission and refraction in glasses and polymers.

##### University Polytechnic School (Teruel)

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

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**Assignments (10 outside class hours)**

**Study (78 outside class hours)**

It will include personal 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

**Learning units:**

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.

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

- Three class 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**