

## 29918 - Materials Engineering

### Información del Plan Docente

|                  |   |
|------------------|---|
| Academic Year    | 2017/18   |
| Faculty / School | 110 - Escuela de Ingeniería y Arquitectura      |
| Degree           | 435 - Bachelor's Degree in Chemical Engineering |
| ECTS             | 6.0   |
| Year             | 2   |
| Semester         | Second semester                                 |
| Subject Type     | Compulsory                                      |
| Module           | ---   |

### 1.General information

#### 1.1.Introduction

#### 1.2.Recommendations to take this course

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

#### 1.4.Activities and key dates

### 2.Learning goals

#### 2.1.Learning goals

#### 2.2.Importance of learning goals

### 3.Aims of the course and competences

#### 3.1.Aims of the course

#### 3.2.Competences

### 4.Assessment (1st and 2nd call)

#### 4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

### 5.Methodology, learning tasks, syllabus and resources

#### 5.1.Methodological overview

1. The lectures are based on the explanation of the subject fundamentals. The teacher uses presentations in ppt, accompanied on occasions of videos.
2. Case studies. The Professor poses them in the classroom for discussion on it, at the time corresponding to the content developed in class.

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3. Six 2-hour lab sessions are distributed throughout the course. Before each session, the student must have read the script and completed a prior questionnaire. During and after each practice session the student must make a report.
4. Work material selection: each student will perform a work, where he must justify the choice of certain materials for a particular application or specific products. This work will be presented in person to the teacher throughout the last week of class or in the days allocated to continuous evaluation
5. Group work using problem based learning methodology. Multidisciplinary work in groups of five/six students with the subjects of Mechanical Engineering and Fluid Mechanics

### 5.2.Learning tasks

### 5.3.Syllabus

**Block A: Study and understanding of the basic concepts associated with the microstructure of materials.**

Crystalline and noncrystalline materials, crystalline imperfections, diffusion, alloys' types, equilibrium diagrams. The Iron-Iron carbide diagram

**Block B: Materials testing and correlation of the properties of a material with its microstructure. This block is mainly developed in laboratory sessions .** Tensile tests, hardness tests , micro hardness tests, Charpy impact tests, metallographic microscopic, thermal shock glasses. Strain hardening, annealing. Thermal treatments in steel.

**Block C: Metallic materials .** Steels: fabrication, forming operations, types, properties and applications. Foundries: types, properties and applications. Non-ferrous alloys: types, properties and applications. Thermal and thermal- chemical treatments. Corrosion prevention

**Block D. Ceramics :** types, properties and applications. **Polymers :** types, properties and applications. **Composite materials :** types, properties and applications

### 5.4.Course planning and calendar

### 5.5.Bibliography and recommended resources

W.D. Callister & D. G. Rethwisch: "Ciencia e ingeniería de materiales". Reverté, 2016

W. F. Smith & J. Hashemi: "Fundamentos de la ciencia e ingeniería de materiales". McGraw-Hill,

2014

Normas UNE-EN-ISO de Materiales y de Ensayos de materiales



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