30010 - Material Engineering: the Basics

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	436 - Bachelor's Degree in Industrial Engineering Technology
ECTS	6.0
Course	2
Period	First semester
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning process has been designed based on the following methodology. It is intended for students to keep the habit of continuous work, which is considered essential in this subject.

1. The lectures are based on the explanation of the subject fundamentals. Before every lesson the student must solve a questionnaire based on readings available through the ADD.

2. The problems classes are based on the students' personal work. The specific problems to be solved in every session

will be announced, and their resolution will be part of the assessment activities.

3. The six 2-hour lab sessions are designed to be self-consistent. Before each session the student must have read the practice explanation and solved a previous questionnaire. A report must be prepared after the session.

4. A group work will be proposed at the beginning of the course and presented during the last month. It is based on the selection of materials for a particular application.

5. Personal work based on studying the lessons and solving the problems is essential in the learning process and will allow the student to successfully face the assessment.

5.2.Learning activities

5.3.Program

The program is divided in three blocks:

A: STRUCTURE OF MATTER

1.- Crystal structures

2.- Defects and diffusion

3.- Phase diagrams and Fe-C diagram

4.- Phase transformations

B: MATERIALS PROPERTIES

5.- Mechanical properties and thermal treatments

6.- Failure

7.- Fatigue and creep

8.- Thermal properties

9.- Electrical properties

10.- Magnetic properties

11.- Optical properties

C: GROUPS OF MATERIALS

12.- Ferrous and non-ferrous alloys

13.- Ceramics

14.- Polymers

15.- Composite materials

The lab program is divided in the following sessions:

- Tensile test in metals and polymers

- Rockwell and Brinell hardness tests. Charpy impact test

- Strain hardening. Annealing

- Thermal treatments in steel

- Precipitation hardening in aluminium alloys

- Thermal expansion and thermal conductivity in metals and alloys. Thermal shock in glasses

5.4.Planning and scheduling

5.5.Bibliography and recomended resources