

## 30024 - Materials: Technology

### Syllabus Information

**Academic year:** 2024/25

**Subject:** 30024 - Materials: Technology

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 330 - Complementos de formación Máster/Doctorado  
436 - Bachelor's Degree in Industrial Engineering Technology

**ECTS:** 6.0

**Year:** 436 - Bachelor's Degree in Industrial Engineering Technology: 3

330 - Complementos de formación Máster/Doctorado: XX

**Semester:** First semester

**Subject type:** 436 - Compulsory

330 - ENG/Complementos de Formación

**Module:**

### 1. General information

The objective of the subject is to understand the importance of the forming and manufacturing processes of parts and components in obtaining different internal structures in the materials (microstructure, internal defects, inclusions), which conditions their properties and behavior in service. It discusses how the design of the forming processes allows the material to achieve the necessary properties to achieve the minimum performance that satisfies the operational conditions. Techniques for inspecting the condition of materials in service and for monitoring their damage or degree of deterioration are described. Finally, basic aspects of surface engineering of interest for Industrial Technology Engineering are described.

These approaches and objectives are aligned with some of the Sustainable Development Goals, SDGs, of the Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>) and certain specific goals, so that the acquisition of the learning results of the subject provides training and competence to the student to contribute to some extent to their achievement:

Goal 9: Industry, innovation and infrastructure.

9.4 By 2030, upgrade infrastructure and convert industries to be sustainable, using resources more efficiently and promoting the adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.

Goal 12: Ensure sustainable consumption and production patterns.

Target 12.2. By 2030, to achieve sustainable management and efficient use of natural resources.

Target 12.5 By 2030, significantly reduce waste generation through waste prevention, reduction, recycling, and reuse.

### 2. Learning results

1- Understand the relationship between the manufacturing and post-treatment of industrial parts and components with the final structure obtained from the different materials, and its influence on the properties and other important properties associated with their behavior in service.

2- Know the most suitable manufacturing and processing technologies for the different materials according to the part to be produced and the part to be produced, and the desired properties in service, including the usual surface treatments and coatings.

3 - Know and understand the different mechanisms of deterioration of materials in service, the techniques of in-service inspection of materials by non-destructive testing, and the basic methodology for improving the design, composition and structure of components to cope with in-service conditions.

### 3. Syllabus

#### 1. Class topics

- Forming of metallic materials.
- Rheology and Forming of polymeric materials.
- Forming of polymer matrix composite materials.
- Ceramic and glass forming.
- In-service inspection techniques. Non-destructive testing.
- Surface treatments and basic coatings.
- Bonding technologies. Metal welding.
- Behavior in service: metallic corrosion and degradation. Problems.

- Behavior in service: mechanical and thermomechanical stresses.

## 2. Laboratory Practices

- Non Destructive Testing. Powder Compaction. Glass breakage. Polymer Rheology/Viscosity.

Basic aspects of electrochemical corrosion. Selection of materials with CES.

## 4. Academic activities

- Full group lectures (30 hours)

- Classes of exercises and problems in full group (15 hours).

- Practical sessions (12 hours). These sessions are highly recommended. In these lectures, the topics presented in the lectures are discussed in depth.

- Tutored coursework (3 hours). It will be carried out in groups of three people and each group will prepare a presentation on which questions will be asked.

- Personal work (84 hours) necessary for the study of the theory, realization of problems, elaboration of work and practice reports.

Assessment 6 hours.

## 5. Assessment system

There is an assisted evaluation consisting of a practical part (in laboratory) and a theoretical part (work and exams); each one must be passed independently with a minimum grade of 5:

1. Laboratory practices (20% final grade). Qualification computable if and only if the reports corresponding to all of them have been submitted.

2. Work and partial and global tests (80% final grade). The combined passing grade for the following three activities must be at least 5:

- *Elaboration and oral presentation of a group work on a topic of application of the subject (15%).*

A grade equal to or higher than 4 must be obtained in order to be counted.

- *Optional partial test (15% final grade).* The structure of this test is the same as that of the global test. At least a grade of 4 must be obtained to be counted.
- *Comprehensive exam (50% of the final grade).* It consists of three parts: A first part with questions of type test (30% of the grade of the test), a second part of development questions (30% of the final grade of the test), and a third part of problems (40% of the final grade of the test). A minimum score of 4 must be obtained to compute.

For those students who have not participated in the assisted evaluation and have not completed the laboratory practicals, the global test will have a second part that will consist of a written and/or practical exam on the laboratory practices of the program.

## 6. Sustainable Development Goals

9 - Industry, Innovation and Infrastructure

12 - Responsible Production and Consumption