

## 25883 - Advanced Materials and Processes

### Syllabus Information

**Academic year:** 2024/25

**Subject:** 25883 - Advanced Materials and Processes

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

**Degree:** 558 - Bachelor's Degree in Industrial Design and Product Development Engineering

**ECTS:** 6.0

**Year:** 3

**Semester:** Second semester

**Subject type:** Compulsory

**Module:**

### 1. General information

The general objective of the subject contents is that the students know the machining processes by chip removal, finishing, their verification, their automation, their applications and determining factors when manufacturing the product. Likewise, the importance of the analysis of in-service material failures will be analyzed. The subject also addresses the issue of recycling and waste management from a social and economic point of view.

### 2. Learning results

Students must demonstrate that:

- Knows surface modification techniques that will provide materials with specific characteristics, with improved resistance to corrosion, temperature, wear, etc. and/or an attractive aesthetic finish.
- Know and interpret the guidelines or steps to perform an analysis of the causes and failure modes in parts or equipment.
- Know material recycling models and be able to determine which materials or processes are environmentally friendly.
- Interpret the metrological control guidelines used to ensure the quality of products and processes.
- Identify different manufacturing processes and systems, including advantages and disadvantages, and shortcomings that may be present in their application.
- Select the most suitable manufacturing processes based on the knowledge of their capabilities and limitations and according to the technological, technical and economical requirements of the product and the market requirements.

### 3. Syllabus

1. In-service failure analysis. Investigation and identification techniques: non-destructive testing.

2. Recycling of materials. Waste recovery. Definition and classification of waste.

Waste separation, identification, classification and recovery procedures. Recycling of specific products. Materials in Ecodesign.

3. Modification of surfaces and coatings. Classification. New surface treatments.

4. Separation manufacturing processes. Machining by metal removal, abrasives, electroerosion, etc and special machining.

5. Finishing Processes.

6. Automation of manufacturing processes.

7. Metrology; dimensional measurement, shapes and roughness, measurement assurance.

### 4. Academic activities

- Lectures: 26 hours. The contents of the subject will be presented, with a practical orientation towards the application of materials in product design.
- Types of problems: 10 hours
- Practical laboratory classes: 15 hours, with 5 sessions of 3 hours each.
- Resolution and presentation of papers: 30 hours, including course and module work.
- Personal study. 62 hours.
- Passing of tests: 8 hours

## 5. Assessment system

The subject will be evaluated in the **global assessment** modality by means of the following activities:

### Assessment part of **Materials**

37% General examination by means of a test questions and a problem.

8% Grading of the internship based on questionnaires on the practice activities 5% Module work

In order to be able to average the grades of the assignments, practicals and exams, it is necessary to have a minimum of 4 points in each of them.

### Assessment part of **Processes**:

30% General examination (35% problems and 65% theoretical and theoretical-practical questions).

12.5% Qualification of the practices based on exercises and work reports that will be handed in on the dates indicated at the beginning of the subject.

5% Module work

2,5% Activities such as questionnaires or deliverables.

In order to be able to average the grades of the assignments, practicals, problem exam and theoretical and theoretical-practical questions exam , it is necessary to have a minimum of 4.5 points in each of them.

50% of the grade corresponds to the process part and the other 50% to the materials part.

A minimum grade of 5.0 in each block is required to pass the subject.

If the student has not passed any of these activities during the semester, they will have the opportunity to pass the subject by means of a global test in the two official exam calls.

## 6. Sustainable Development Goals

9 - Industry, Innovation and Infrastructure

12 - Responsible Production and Consumption

13 - Climate Action