

## 29620 - Manufacturing Technology

### Syllabus Information

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**Academic year:** 2023/24

**Subject:** 29620 - Manufacturing Technology

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

**Degree:** 430 - Bachelor's Degree in Electrical Engineering

**ECTS:** 6.0

**Year:** 3

**Semester:** First semester

**Subject type:** Compulsory

**Module:**

### 1. General information

#### Objectives of the subject

This subject, as a common and mandatory element in the training of any future graduate belonging to the Industrial Branch, tries to cover the main aspects of Manufacturing Technologies that the student may encounter in their future professional career, providing a solid base from which to face and solve certain problems of the particular field of the Degree in Electrical Engineering: either in its facet of product development or through the interaction with the production processes themselves.

The first objective of the course is to provide the student with a broad knowledge base on the fundamentals and intrinsic characteristics of the main manufacturing processes used in the industry, such as molding, plastic deformation, machining or welding. Subsequently, with this knowledge, the student will be able to deepen in the learning of aspects related to the design and development of mechanical components structuring it in phases and applying a correct methodology. On the other hand, the student should also know and understand how the different systems and levels of automation existing today can condition the design of a product according to productivity and flexibility criteria.

Finally, as a transversal element to any production system, the main integral quality models will be studied the student must learn how to integrate the manufacturing and measuring functions in them.

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 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all. Targets 8.1 and 8.2.

Goal 9: Industry, Innovation and Infrastructure. Target 9.4.

Goal 12: Ensure sustainable consumption and production patterns. Targets 12.2, 12.4, 12.5 and 12.8.

#### Recommendations for taking the subject

It is considered advisable to have previously passed the subjects of **Graphic Expression and Computer Aided Design and Materials Engineering**. It is important to have a telematic connection to access the teaching platform. Safety footwear must also be available for access to the workshop for machining practices.

### 2. Learning results

1. Acquires a broad knowledge base based on scientific, technological and economic criteria on the different manufacturing processes and systems.
2. Identify their advantages and disadvantages, as well as the defects that may be present in their application, the means to control and avoid them.
3. 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
4. Recognize and applies the basic considerations for setting up a process sheet
5. Interpret metrological control guidelines used to ensure the quality of products and processes
6. Know the different existing automation systems and levels, selecting the most appropriate one according to the productivity and flexibility criteria
7. Know industrial quality models and is capable of integrating manufacturing and measurement functions into these models
8. Acquire a critical attitude towards solutions already used, so as to encourage him/her to deepen the study and analysis of the topics covered in this discipline and to propose innovative strategies

### 3. Syllabus

**Theoretical-practical syllabus:**

## **Block 1. Introduction to manufacturing processes**

Definitions

Classification according to DIN 8580

## **Block 2. Manufacturing processes and technologies**

### 2.1. Processes for preforming

Casting, molding and injection processes.

Powder metallurgy.

Additive technologies.

### 2.3. Material removal processes

Fundamentals of machining processes.

Technological aspects of turning, drilling and milling processes.

Tools: materials, geometry and selection criteria.

Machining processes using abrasives.

Non-conventional machining processes: EDM?

### 2.2. Deformation processes

Volumetric deformation: Rolling, forging, extrusion and drawing.

Deformation of sheet metal: Cutting, drawing, folding...

### 2.4. Bonding processes

Welding metallurgy.

Welding processes.

Other joining processes.

## **Block 3. Manufacturing systems**

Characterization of manufacturing systems and their automation.

Machine tool programming.

Tools.

Maintenance

## **Block 4. Metrology and industrial quality**

### 4.1 Metrology

Inspection and industrial metrology.

Measurement assurance.

Measurement systems and methods.

Adjustments and tolerances

### 4.2 Quality

Fundamental concepts of quality.

Quality planning.

Quality in product and process design.

Quality in manufacturing.

## **Laboratory/workshop practicals**

1. Foundry

2. Deformation

3. Separating (Lathe, Milling Machine, Grinding Machine, EDM,...)

4. Welding

5. Measurement in dimensional metrology.

6. Maintenance

## **4. Academic activities**

### **Methodology**

The methodology proposed in this face-to-face teaching process will be developed in three main levels: theory classes, problems and laboratory, with an increasing level of student participation.

In the sessions with the entire group, the more theoretical aspects are dealt with in the form of a lecture and are complemented by the study of problems and technical cases. The practical sessions are developed in smaller groups to work with specialized computer applications and fabrication shop equipment.

### **Activities**

Attendance to all learning activities is of special relevance to acquire the competencies of the subject.

#### **Face-to-face activities: 2.4 ECTS (60 hours)**

1. **Lectures** (28 hours).
2. **Problem classes and case resolution** (14 hours).
3. **Laboratory practices** (18 hours).

#### **Non-face-to-face activities: 3.6 ECTS (90 hours)**

4. **Study and teamwork** (85 hours).
5. **Assessment tests** (5 hours)

## **5. Assessment system**

The student must demonstrate that they have achieved the expected learning results by means of the following assessment activities

### **Test 1 (practical): It will account for 30% of the final grade of the subject.**

This test is associated with the practical sessions. Thus, the work done during these sessions throughout the term will be evaluated, and a minimum grade of 4.5 out of 10 points (representing 30% of the total grade of the subject) must be obtained in order to be averaged with the grade associated with test 2. All those students who have not achieved this minimum grade will have to take a specific individual test during the assessment period in the two official call.

### **Test 2. It will account for 70% of the final grade of the subject.**

It will be composed of theoretical-practical questions/problems, to be carried out in the Official Calls. This test will be graded from 0 to 10 points, and a minimum grade of 4 points must be obtained in each part in order to average with the grade associated with test 1. The grade of this test will represent 70% of the total grade of the subject.

The student who wishes to do so may eliminate material from this final test by means of the tests that are given at the end of each class/topic during the course, on a voluntary basis. In order for such elimination to be effective, the student must obtain a minimum grade of 5 points out of 10..

The overall grade for the subject will be obtained from the weighted average of the two tests, being necessary to obtain a value equal to or higher than 5.0 to pass. The results obtained in the tests passed will be maintained until the end of the academic year.

Alternatively, the student has the possibility of passing the subject by means of the global assessment in the official calls for exams.