

## 30029 - Manufacturing Technology

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 30029 - Manufacturing Technology

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

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

**ECTS:** 6.0

**Year:** 3

**Semester:** Second semester

**Subject type:** Compulsory

**Module:**

### 1. General information

The objective of the subject is to learn aspects related to machining processes, metrology and quality control involved in the manufacture of industrial products. The course aims to provide the student with knowledge of the fundamentals of the different machining processes, with sufficient capacity to analyze the influence of the principles that govern them and to plan machines, tooling, tools, machining operations and metrological control systems. The student should also acquire sufficient knowledge to develop CNC machining programs.

It also aims to provide the student with a global vision of industrial quality techniques applied to the control of processes and products throughout their life cycle. The use of quality and metrology techniques is essential to guarantee the efficiency of industrial production processes, which has led to the implementation and improvement of standardized Quality Management Systems, generalized in the industrial environment.

These approaches and objectives are aligned with some of the Sustainable Development Goals, SDGs: 9.4, 12.2, 12.5 and 12.8.

### 2. Learning results

Acquire a broad knowledge base based on scientific, technological and economic criteria on the different manufacturing processes and systems.

To identify the advantages and disadvantages of different manufacturing processes and systems, as well as the defects that their application may present and the means to control and prevent them.

To select the most suitable machining manufacturing processes based on the knowledge of their capabilities and limitations, and according to the technological, technical, and economic demands of both the product and the market.

Recognize and apply the basic considerations for setting up a process sheet

Interpret metrological control guidelines used to ensure the quality of products and processes

Know the different existing automation systems and levels, selecting the most appropriate one according to the productivity and flexibility criteria.

Know industrial quality models and is capable of integrating manufacturing and measurement functions into these models.

### 3. Syllabus

#### Theoretical-practical syllabus

1. -Fundamentals of machining processes: Movements and parameters in machining processes. Technological aspects of turning, drilling and milling processes. Tools: materials, geometry and criteria for selection. Machining processes using abrasives. Non-conventional machining processes: EDM...

2. -Cutting mechanics and machining economy: Mechanics of chip formation. Cut kinematics and dynamics. Energy balance of machining. Tool wear and lubrication. High speed machining. Optimization of machining.

3. -Manufacturing Systems. Characterization of manufacturing systems and their automation. Tools. Criteria for selection of machining equipment. Machine tool programming.

4. -Process planning. CAPP.

5. -Metrology: Inspection and industrial metrology. Measurement assurance. Measurement systems and methods.

6. -Quality: Fundamental concepts of quality. Quality management. Quality planning. Quality in product and process design. Quality in manufacturing.

#### Laboratory practices

1. Turning and grinding processes

2. Drilling, milling and EDM processes.

3. CNC programming of machine tools.

4. Geometric measurement with conventional systems and with three-coordinate measuring systems.
5. Measurement and calibration in dimensional metrology.
6. QFD and FMEA.

#### **4. Academic activities**

Theoretical classes: 28 hours. Expository sessions of theoretical and practical content covering the concepts and fundamentals of manufacturing technologies. Its objective is to present to the student the knowledge and skills that they should be able to acquire by facilitating their assimilation.

2) Problem classes (14 hours). The problem classes are integrated with the theory classes to facilitate their learning as well as to provide a practical and applied vision of the different points of the theory.

3) Laboratory practices (18 hours). The students, organized in small groups, will conduct six three-hour practical sessions in workshops and laboratories. These sessions complement those parts of the subject that require the use of specific equipment. In these practical sessions, the safety aspects to be followed in a mechanical workshop and the necessary PPE are presented and evaluated.

#### **5. Assessment system**

Gradual assessment: the tests of the gradual assessment release subject matter in any of the two official calls.

1) Assessment of practical sessions. It represents 30% of the final grade and releases the student from the global practical exam. This block consists of the elaboration of a set of reports and questionnaires in the ADD related to the practical sessions. Obtaining grades lower than 4.0 in any report or quiz will result in a negative assessment of the test. In such a case, it may be made up in the comprehensive practice exam.

2) Metrology/Quality Control. It accounts for 30% of the final grade and a minimum grade of 4.0 must be obtained, with a minimum of 3 out of 10 on the problem.

3) Control over Machining. It accounts for 40% of the final grade. A minimum of 3 out of 10 must also be obtained on each problem and 4.0 on the total in order to be averaged.

During the term, one of the two controls will be carried out, depending on where the term starts. It will be the same for all teaching groups and its date will be available at the beginning of the term. The other will take place at the official call.

Global assessment: to be carried out, on the date set by the center, by students who have not passed its minimums. It consists of the following tests with the same percentages as the gradual assessment: comprehensive practical exam and two written tests on theoretical and practical issues, problems and technical cases related to the subject taught.