

## Course guide

### 320146 - PF - Manufacturing Processes

**Last modified:** 19/04/2023

**Unit in charge:** Terrassa School of Industrial, Aerospace and Audiovisual Engineering  
**Teaching unit:** 712 - EM - Department of Mechanical Engineering.

**Degree:** BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2010). (Compulsory subject).

**Academic year:** 2023    **ECTS Credits:** 6.0    **Languages:** Catalan, Spanish

#### LECTURER

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**Coordinating lecturer:** José Antonio Ortiz Marzo

**Others:** José Antonio Ortiz Marzo  
Carlos Rio Cano  
José Marin Sierra

#### PRIOR SKILLS

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It is not necessary that students have any prior special training due to the specific nature of the subject.

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

CED50-DIDP. Knowledge of the fundamentals of manufacturing processes for the transformation of metals, polymers, and ceramics. (Common module in the industrial branch)

CED51-DIDP. Ability to identify the machinery used and the parameters to control in different processes. (Common module in the industrial branch)

CED52-DIDP. Ability to select, design, and optimize the most suitable manufacturing processes based on design, material, part use, and environmental impact. (Common module in the industrial branch)

CED53-DIDP. Ability to associate design possibilities with each manufacturing process. (Common module in the industrial branch)

#### TEACHING METHODOLOGY

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- Theoretical sessions and resolution of exercises.
- Practice sessions in the laboratory.
- Independent work and exercises.

#### LEARNING OBJECTIVES OF THE SUBJECT

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- To introduce concepts, techniques and methodologies in the manufacturing area.
- To provide an overview of the relationship between design and manufacturing.
- To know and use the main machine-tool and technical language typical of manufacturing industrial environment.

## STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	20.00
Self study	90,0	60.00
Hours small group	30,0	20.00

**Total learning time:** 150 h

## CONTENTS

### TOPIC 1. Metrology

#### Description:

- 1.1. Tolerances and adjustments
- 1.2. Surface states, roughness
- 1.3. Measuring instruments
- 1.4. Errors in the measurement
- 1.5. Safety measures.

#### Specific objectives:

- To know and use the different measurement and verification tools, as well as their particular application and manipulation.

#### Related activities:

AVMET: Metrology practices and exercises in theory sessions and problems.

AVSEG: Application of safety measures to manufacturing and quality control processes.

#### Full-or-part-time: 27h

Theory classes: 6h

Laboratory classes: 6h

Self study : 15h

## TOPIC 2. Machining processes

### Description:

- 2.1. Introduction machining processes
- 2.2. Machine-tools. Cutting Materials and Coatings
- 2.3. Turning
- 2.4. Drilling, Reaming and Threading
- 2.5. Milling
- 2.6. Safety measures

### Specific objectives:

- To know and differentiate the different machines of machining processes and accessories available in the workshop.
- To learn the correct way of using it, as well as the basic safety and behavior norms in a mechanical workshop.

### Related activities:

AVMEC: Internships in Mechanical Workshop for machining parts.

AVSEG: Application of safety measures to manufacturing and quality control processes.

**Full-or-part-time:** 66h

Theory classes: 12h

Laboratory classes: 12h

Self study : 42h

## TOPIC 3. Joining and cutting processes

### Description:

- 3.1. Electric arc welding
- 3.2. Resistance welding
- 3.3. Oxyacetylene welding
- 3.4. Advanced welding processes (laser, plasma,...)
- 3.5. Cutting processes: by Water, laser, flame cutting
- 3.6. Gluing processes
- 3.7. Safety measures.

### Specific objectives:

To know and differentiate the different machines and accessories available in the workshop.

To learn the correct way of using them, as well as the basic rules of security and behavior in a mechanical workshop

### Related activities:

AVUT: welding practices

AVSEG: Application of safety measures to manufacturing and quality control processes.

**Full-or-part-time:** 28h

Theory classes: 6h

Laboratory classes: 4h

Self study : 18h

#### TOPIC 4: Other processes of transformation

**Description:**

- 4.1. Hot forming (Casting, Forging, Sintering)
- 4.2. Cold forming (Cutting, drawing, bending)
- 4.3. Electrical Discharge Machining
- 4.4. Safety measures

**Related activities:**

AVSEG: Application of safety measures to manufacturing and quality control processes.

**Full-or-part-time:** 19h

Theory classes: 4h

Laboratory classes: 4h

Self study : 11h

#### TOPIC 5: Numerical Control (CNC)

**Description:**

- 5.1. Definition Numerical Control
- 5.2. Machines with CNC
- 5.3. Classifications CNC
- 5.4. Components of machines with CNC
- 5.5. Axes and reference systems
- 5.6. Programming
- 5.7. Languages used (Heidenhain, Fagor)
- 5.8. ISO programming language
- 5.9. Common types of functions
- 5.10. Scheduling workflows.

**Specific objectives:**

To know the different programming tools available.

To know the different CNC machines available.

**Related activities:**

AVCNC: Demonstration practices operation and programming of CNC machines.

**Full-or-part-time:** 10h

Theory classes: 2h

Laboratory classes: 4h

Self study : 4h

## GRADING SYSTEM

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Individual written tests: 25% first test, 25% final test.

Work in group-based on problem solving, work of the subject and activity AVSEG: 25%

Reports activities in group linked AVMV, AVMEC, AVUT, AVCNC: 25%

The result of unsatisfactory Activity first test can redirect through a written test to be held on the day fixed for the final exam scheduled on the same track (3 hours). This test can be accessed by students with a grade of less than 5 self assessment). The rating of the test will be between 0 and 10, will have the weight corresponding to that activity. The grade for the application of renewal replace the initial qualification provided that it is superior.

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.

If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

## EXAMINATION RULES.

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It is necessary to fulfill all the specifications of the different activities required, for its complete evaluation.

## RESOURCES

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### Other resources:

Class notes and all material available at Athena