



## Course guides

# 320056 - EPF - Engineering of Manufacturing Processes

Last modified: 29/05/2020

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

**Degree:** BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Compulsory subject).

**Academic year:** 2020    **ECTS Credits:** 6.0    **Languages:** Catalan, Spanish

### LECTURER

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**Coordinating lecturer:** Jordi Sans García

**Others:**

### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

4. MEC: Applied Knowledge in systems and fabrications processes, metrology and quality control.

**Transversal:**

1. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.
2. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.
3. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

### TEACHING METHODOLOGY

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In the theory sessions, the teacher will introduce the theoretical basis.

Laboratory sessions.

Individual work and problem solving.

### LEARNING OBJECTIVES OF THE SUBJECT

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- Introduce concepts, techniques and methodologies in the area of manufacturing.
- Provide an overview of the relation between design and manufacturing.
- Familiarization and use of technical language of industrial environment.

### STUDY LOAD

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Type	Hours	Percentage
Self study	84,0	58.33
Hours large group	45,0	31.25
Hours small group	15,0	10.42

**Total learning time:** 144 h



## CONTENTS

### TOPIC 1: Metrology and verification

**Description:**

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

**Specific objectives:**

(ENG) - conèixer i utilitzar les diferents eines de medició, així com la seva particular aplicació i manipulació

**Related activities:**

Laboratory description: based on the practice of obtaining measurements to objects by using the tools available for this purpose.

**Full-or-part-time:** 18h

Theory classes: 4h

Practical classes: 2h

Laboratory classes: 2h

Self study : 10h

### TOPIC 2: Machining processes

**Description:**

- 2.1 Machining
- 2.2 File and mechanical brushing
- 2.3 Turning
- 2.4 Drill and ream
- 2.5 Milling
- 2.6 Abrasive machining
- 2.7 Sawed and smoothed
- 2.8 Gears manufacture

**Specific objectives:**

(ENG) - conèixer i diferenciar les diferents màquines i complements disponibles en el taller.

- Aprendre la manera correcta d'utilització, així com les normes bàsiques de seguretat i comportament en un taller mecànic

**Related activities:**

Description laboratory: Step by different workstations where you can perform various tasks, such as turning operations, milling, assembly...

**Full-or-part-time:** 41h

Theory classes: 10h

Practical classes: 5h

Laboratory classes: 6h

Self study : 20h



### TOPIC 3: Joining and cutting processes

**Description:**

- 3.1 Resistance welding
- 3.2 Oxyacetylene welding
- 3.3 Electric arc welding
- 3.4 Flame cutting

**Related activities:**

Step by different workstations where you can perform welding and cutting.

**Full-or-part-time:** 11h

Theory classes: 3h  
Practical classes: 1h 30m  
Laboratory classes: 1h 30m  
Self study : 5h

### TOPIC 4: Applications of investors connected to the network

**Description:**

- 4.1 EDM (Electrical Discharge Machining)
- 4.2 Laser
- 4.3 Cutting water

**Full-or-part-time:** 9h 30m

Theory classes: 3h  
Practical classes: 1h 30m  
Self study : 5h

## TOPIC 5: Renewable Energy applications and others

### Description:

- 5.1 Definition
- 5.2 Short history
- 5.3 Machines with CNC
- 5.4 CNC classifications
- 5.5 Components of machines with CNC
- 5.6 Axes and reference systems
- 5.7 Programming
- 5.8 Languages used
- 5.9 Storage of these programs
- 5.10 ISO programming language
- 5.11 Common types of functions
- 5.12 Scheduling workflows.
- 5.13 Parametric programming
- 5.14 Working in 3D
- 5.15 Use of auxiliary programs
- 5.16 CAM

### Specific objectives:

(ENG)

- conèixer i aprendre a utilitzar les diferents eines de programació disponibles.
- conèixer i aprendre a utilitzar les diferents màquines de cnc disponibles

### Related activities:

In the laboratory: basic problems of programming and the practical application of problems to the machine.

**Full-or-part-time:** 40h 30m

Theory classes: 10h

Practical classes: 5h

Laboratory classes: 5h 30m

Self study : 20h

## GRADING SYSTEM

Written tests: there will be two written tests, each with a value of 25% of the final mark (25% + 25%)

Problem solving: 22%

Report / s of individual labs: 30%

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.

## BIBLIOGRAPHY

### Basic:

- Falk, D. [et al.]. Metalotecnia fundamental. Barcelona: Reverté, 1986. ISBN 8429160477.
- DeGarmo, E. P.; Black, J. T.; Kohser, R. A. Materiales y procesos de fabricación. 2ª ed. Barcelona: Reverté, 1994. ISBN 8429148221.
- Echepare Zugasti, R.; López de Lacalle, L. N. Control numérico: conceptos y programación. Bilbao: Ediciones Técnicas Ízaro, 1990.
- Sans García, J. Heidenhain: aplicaciones de control numérico para fresadora [on line]. Barcelona: Edicions UPC, 2008 [Consultation: 12/05/2020]. Available on: <http://hdl.handle.net/2099.3/36791>. ISBN 9788483017623.



**Complementary:**

- Vivancos Calvet, J. Control numèric, vol. 2, Programació [on line]. 3a ed. Barcelona: Edicions UPC, 1997 [Consultation: 22/10/2020]. Available on: <http://hdl.handle.net/2099.3/36326>. ISBN 8483012189.
- Técnicas del taller mecánico. Barcelona: CEAC, 1977. ISBN 8432942111.
- Leyensetter, A.; Würtemberguer, G. Tecnología de los oficios metalúrgicos. Barcelona: Reverté, 1974. ISBN 8429160663.
- Lasheras, José M. Tecnología mecánica y metrotecnica. Bilbao: Donostiarra, 1997. ISBN 8470630881.