



## 1. General information

**Course:** MANUFACTURING TECHNOLOGY**Type:** CORE COURSE**Degree:** 351 - UNDERGRADUATE DEGREE PROG. IN MECHANICAL ENGINEERING**Center:** 106 - SCHOOL OF MINING AND INDUSTRIAL ENGINEERING**Year:** 3**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 56325**ECTS credits:** 6**Academic year:** 2019-20**Group(s):** 56**Duration:** C2**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** ELENA MARIA BEAMUD GONZALEZ - Group(s): 56

| Building/Office | Department                     | Phone number        | Email                     | Office hours                        |
|-----------------|--------------------------------|---------------------|---------------------------|-------------------------------------|
| E'l'huyar 2.06  | MECÁNICA ADA. E ING. PROYECTOS | 926295300 Ext. 6043 | elenamaria.beamud@uclm.es | Lunes: 11,30 a 14,00h 15,20 a 19,20 |

## 2. Pre-Requisites

- Basic knowledge of materials.
- Basic knowledge of production and manufacturing system

## 3. Justification in the curriculum, relation to other subjects and to the profession

The Industrial Engineer is the professional who uses the knowledge of the physical sciences and mathematics and the engineering techniques to develop his professional activity in aspects such as control, instrumentation and automation of processes and equipment, as well as the design, construction, operation and maintenance of industrial products. This training allows you to participate successfully in the different branches that integrate industrial engineering, such as mechanics, electricity, electronics, etc., adapt to the changes in the technologies in these areas and, if necessary, generate them, responding to the needs that are presented in the productive and service branches to achieve the welfare of the society to which it is owed.

Therefore, this subject is responsible for integrating concepts that the student has received in other subjects (calculus, Fundamentals of Computer Science, statistics, Science of materials, etc...) but has not seen a physical utility in a system of Manufacturing. This aspect is very important to be able to form a practical engineer capable of integrating elements that apparently have no relation in a useful system.

In addition this subject facilitates the understanding of the model of organization of the production of a company, that must be employed by the student during his practices in companies and during the development of his project end of degree.

## 4. Degree competences achieved in this course

## Course competences

| Code | Description                                                                                                                                                                                                                                                                                             |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A01  | To understand and have knowledge in an area of study that moves on from the general education attained at secondary level and usually found at a level that, while supported in advanced text books, also includes some aspects that include knowledge found at the cutting edge of the field of study. |
| A02  | To know how to apply knowledge to work or vocation in a professional manner and possess the competences that are usually demonstrated by the formulation and defence of arguments and the resolution of problems in the field of study.                                                                 |
| A03  | To have the capability to gather and interpret relevant data (normally within the area of study) to make judgements that include a reflection on themes of a social, scientific or ethical nature.                                                                                                      |
| A04  | To be able to transmit information, ideas, problems and solutions to a specialized audience.                                                                                                                                                                                                            |
| A07  | Knowledge of Information Technology and Communication (ITC).                                                                                                                                                                                                                                            |
| A08  | Appropriate level of oral and written communication.                                                                                                                                                                                                                                                    |
| A12  | Knowledge of basic materials and technologies that assist the learning of new methods and theories and enable versatility to adapt to new situations.                                                                                                                                                   |
| A13  | Ability to take the initiative to solve problems, take decisions, creativity, critical reasoning and ability to communicate and transmit knowledge, skills and abilities in Mechanical Engineering.                                                                                                     |
| A15  | Ability to work to specifications and comply with obligatory rules and regulations.                                                                                                                                                                                                                     |
| A17  | Ability to apply principles and methods of quality control.                                                                                                                                                                                                                                             |
| A18  | To have organization and planning skills used in businesses and other institutions and organizations.                                                                                                                                                                                                   |
| A19  | Ability to work in a multilingual and multidisciplinary environment.                                                                                                                                                                                                                                    |
| CB01 | Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.                                         |
| CB02 | Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.                                                                                                        |
| CB03 | Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.                                                                                                                        |
| CB04 | Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.                                                                                                                                                                                                   |
| CB05 | Have developed the necessary learning abilities to carry on studying autonomously                                                                                                                                                                                                                       |

## 5. Objectives or Learning Outcomes

### Course learning outcomes

Description

Knowledge of systems of automatization in manufacturing processes

Knowledge of machine tools, tools and equipment in manufacturing processes

Knowledge of the basics of metrology and the application of measuring techniques in quality control in manufacturing

Know the basic theories and technological aspects applied to the systems and processes of manufacturing

Knowledge of the analytical methods in the processes of manufacturing and the calculation of the principle technological parameters

Generic knowledge of the engineering of manufacturing within a production context

Theoretical and applied knowledge of the quality control techniques in manufacturing

## 6. Units / Contents

**Unit 1: TECHNOLOGICAL ASPECTS OF THE MANUFACTURING SYSTEMS**

**Unit 2: CONFORMATION BY REMOVE MATERIAL**

**Unit 3: CONFORMATION BY PLASTIC DEFORMATION**

**Unit 4: CONFORMATION BY MOLDING**

**Unit 5: CONFORMATION BY JOINT OF PARTS**

**Unit 6: DIMENSIONAL METROLOGY**

**Unit 7: QUALITY CONTROL IN MANUFACTURING**

## 7. Activities, Units/Modules and Methodology

| Training Activity                             | Methodology                          | Related Competences<br>(only degrees before RD<br>822/2021)    | ECTS                                           | Hours      | As                                          | Com | R | Description                                                      |
|-----------------------------------------------|--------------------------------------|----------------------------------------------------------------|------------------------------------------------|------------|---------------------------------------------|-----|---|------------------------------------------------------------------|
| Class Attendance (theory) [ON-SITE]           | Lectures                             | A01 A02 A08 A15 A17 A18<br>CB01 CB02 CB03 CB04<br>CB05 D08     | 0.8                                            | 20         | N                                           | -   | - | MASTER LESSONS                                                   |
| Problem solving and/or case studies [ON-SITE] | Cooperative / Collaborative Learning | A02 A03 A08 A13 A15 A17<br>A18 CB01 CB02 CB03<br>CB04 CB05 D08 | 0.6                                            | 15         | N                                           | -   | - | EXERCISES AND PRACTICAL PROBLEMS                                 |
| Laboratory practice or sessions [ON-SITE]     | Work with simulators                 | A02 A03 A07 A08 A13 A18<br>D08                                 | 0.6                                            | 15         | Y                                           | Y   | Y | WORK IN GROUPS, EXERCISES AND PRACTICAL SIMULATION WITH SOFTWARE |
| Group tutoring sessions [ON-SITE]             | Problem solving and exercises        | A02 A03 A12 A13 A15 A17<br>A18 D08                             | 0.2                                            | 5          | N                                           | -   | - | TUTORING                                                         |
| Final test [ON-SITE]                          | Assessment tests                     | A01 A02 A03 A04 A07 A08<br>A12 A13 A15 A17 A18 A19<br>D08      | 0.2                                            | 5          | Y                                           | Y   | Y | TEORICAL AND PRACTICAL TESTS                                     |
| Study and Exam Preparation [OFF-SITE]         | Self-study                           | A02 A03 A12 A15 A17 A18<br>D08                                 | 3.6                                            | 90         | N                                           | -   | - | STUDY AND PREPARE TESTS                                          |
| <b>Total:</b>                                 |                                      |                                                                | <b>6</b>                                       | <b>150</b> |                                             |     |   |                                                                  |
|                                               |                                      |                                                                | <b>Total credits of in-class work: 2.4</b>     |            | <b>Total class time hours: 60</b>           |     |   |                                                                  |
|                                               |                                      |                                                                | <b>Total credits of out of class work: 3.6</b> |            | <b>Total hours of out of class work: 90</b> |     |   |                                                                  |

As: Assessable training activity

Com: Training activity of compulsory overcoming

R: Rescheduling training activity

## 8. Evaluation criteria and Grading System

| Evaluation System             | Grading System |                    | Description                                      |
|-------------------------------|----------------|--------------------|--------------------------------------------------|
|                               | Face-to-Face   | Self-Study Student |                                                  |
| Theoretical papers assessment | 30.00%         | 0.00%              | Final work with contents related to the subject  |
| Final test                    | 70.00%         | 0.00%              | Final test with questions related to the lessons |
| <b>Total:</b>                 | <b>100.00%</b> | <b>0.00%</b>       |                                                  |

### Evaluation criteria for the final exam:

The practices will be valued the utilization and the report of the same one. This activity should be exceeded at least, with a 5 over 10

Laboratory and computer practice sessions will be conducted in small groups. The students will perform different experimental measures in the laboratory or a series of calculations with a computer program.

It will be valued both the work in the laboratory or computer classroom as the report of the practice carried out, having both obligatory and recoverable character.

If the above requirements are not met, students, in order to overcome the subject, must do an examination of practices together with the final examination of the subject, whose value on the final qualification will be, in percentage, the same one that could be obtained with the realization of the practices.

### Specifications for the resit/retake exam:

Students who have not performed the present activities (practices and problems), nor have elaborated the technical work, must undergo a single final examination with all the contents of the subject (practical and theoretical) seen throughout the course.

The minimum mark in each of the parts shall be equal to or bigger than 5. The subject will be exceeded by obtaining an assessment equal to or bigger than 5.

### Specifications for the second resit / retake exam:

Same as for the extraordinary call

| 9. Assignments, course calendar and important dates                                    |       |
|----------------------------------------------------------------------------------------|-------|
| Not related to the syllabus/contents                                                   |       |
| Hours                                                                                  | hours |
| Group tutoring sessions [PRESENCIAL][Problem solving and exercises]                    | 1     |
| Final test [PRESENCIAL][Assessment tests]                                              | 5     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                      | 6     |
| Unit 1 (de 7): TECHNOLOGICAL ASPECTS OF THE MANUFACTURING SYSTEMS                      |       |
| Activities                                                                             | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                       | 2     |
| Problem solving and/or case studies [PRESENCIAL][Cooperative / Collaborative Learning] | 2     |
| Laboratory practice or sessions [PRESENCIAL][Work with simulators]                     | 1     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                      | 8     |
| Unit 2 (de 7): CONFORMATION BY REMOVE MATERIAL                                         |       |
| Activities                                                                             | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                       | 2     |
| Problem solving and/or case studies [PRESENCIAL][Cooperative / Collaborative Learning] | 2     |
| Laboratory practice or sessions [PRESENCIAL][Work with simulators]                     | 1     |
| Group tutoring sessions [PRESENCIAL][Problem solving and exercises]                    | 1     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                      | 10    |
| Unit 3 (de 7): CONFORMATION BY PLASTIC DEFORMATION                                     |       |
| Activities                                                                             | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                       | 2     |
| Problem solving and/or case studies [PRESENCIAL][Cooperative / Collaborative Learning] | 2     |
| Laboratory practice or sessions [PRESENCIAL][Work with simulators]                     | 1     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                      | 10    |
| Unit 4 (de 7): CONFORMATION BY MOLDING                                                 |       |
| Activities                                                                             | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                       | 3     |
| Problem solving and/or case studies [PRESENCIAL][Cooperative / Collaborative Learning] | 2     |
| Laboratory practice or sessions [PRESENCIAL][Work with simulators]                     | 2     |
| Group tutoring sessions [PRESENCIAL][Problem solving and exercises]                    | 1     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                      | 10    |
| Unit 5 (de 7): CONFORMATION BY JOINT OF PARTS                                          |       |
| Activities                                                                             | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                       | 3     |
| Problem solving and/or case studies [PRESENCIAL][Cooperative / Collaborative Learning] | 2     |
| Laboratory practice or sessions [PRESENCIAL][Work with simulators]                     | 2     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                      | 11    |
| Unit 6 (de 7): DIMENSIONAL METROLOGY                                                   |       |
| Activities                                                                             | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                       | 4     |
| Problem solving and/or case studies [PRESENCIAL][Cooperative / Collaborative Learning] | 2     |
| Laboratory practice or sessions [PRESENCIAL][Work with simulators]                     | 2     |
| Group tutoring sessions [PRESENCIAL][Problem solving and exercises]                    | 1     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                      | 15    |
| Unit 7 (de 7): QUALITY CONTROL IN MANUFACTURING                                        |       |
| Activities                                                                             | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                       | 4     |
| Problem solving and/or case studies [PRESENCIAL][Cooperative / Collaborative Learning] | 3     |
| Laboratory practice or sessions [PRESENCIAL][Work with simulators]                     | 6     |
| Group tutoring sessions [PRESENCIAL][Problem solving and exercises]                    | 1     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                      | 20    |
| Global activity                                                                        |       |
| Activities                                                                             | hours |
| Laboratory practice or sessions [PRESENCIAL][Work with simulators]                     | 15    |
| Group tutoring sessions [PRESENCIAL][Problem solving and exercises]                    | 5     |
| Final test [PRESENCIAL][Assessment tests]                                              | 5     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                      | 90    |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                       | 20    |
| Problem solving and/or case studies [PRESENCIAL][Cooperative / Collaborative Learning] | 15    |
| Total horas: 150                                                                       |       |

| 10. Bibliography and Sources |                                                                                                                           |                                      |      |               |      |             |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------|---------------|------|-------------|
| Author(s)                    | Title/Link                                                                                                                | Publishing house                     | Citv | ISBN          | Year | Description |
| D. Rodriguez Salgado         | Soldadura                                                                                                                 | BELLISCO                             |      | 9789688808467 | 2002 |             |
|                              | Conformacion plastica de materiales metalicos (en frio y en caliente): forja, laminacion, estirado etampacion, extrusion, | : CIE Inversiones Editoriales Dossat |      | 9788495279620 |      |             |
| J. Del Rio                   |                                                                                                                           |                                      |      | 8496437094    | 2005 |             |

|                             |                                                                           |                                                                                   |                |      |
|-----------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------|------|
| Kalpakjian, S.              | embuticion<br>Manufacturing engineering and<br>technology                 | Ed. Addison-Wesley                                                                | 978-0133128741 | 2008 |
| L. Sevilla and M. J. Martín | Metrología Dimensional                                                    | Ed. Servicio de<br>Publicaciones de la<br>Universidad de<br>Málaga<br>McGraw-Hill | 9788497470810  | 1990 |
| M. P. Groover               | Fundamentos de manufactura<br>moderna                                     | /Interamericana de<br>Mexico                                                      | 9789701062401  | 2007 |
| M. P. Groover               | Fundamentos de manufactura<br>moderna: materiales, procesos y<br>sistemas | Prentice Hall<br>Hispanoamericana                                                 |                | 1997 |