Universidad Zaragoza

Academic Year/course: 2022/23

28821 - Manufacturing Process I

Syllabus Information

Academic Year: 2022/23
Subject: 28821 - Manufacturing Process I
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 424 - Bachelor's Degree in Mechatronic Engineering
ECTS: 6.0
Year: 3
Semester: First semester
Subject Type: Compulsory
Module:

1. General information

1.1. Aims of the course

The great variety of objects, pieces, products ... that there are in the market have been obtained through a more or less complex production process. This course provides the keys to determine some of them. Selecting a production process is a global objective in the course.

A product has finish, precision specifications ... which are consistent with its function. Adapting the functionality of the product with criteria of sufficient quality makes the task of selecting a specific production process easier.

All manufactured components have a life and a cost. Connecting these variables and get the component to fulfil its function with the guarantee is a challenge to achieve.

Selecting a production process is the overall aim of the course.

These approaches and objectives are aligned with the following Sustainable Development Goals of the United Nations 2030 Agenda (https://www.un.org/sustainabledevelopment/es/), in such a way that the acquisition of the results of Learning the subject provides training and competence to contribute to some extent to its achievement:

Objective 9: Industry, innovation and infrastructure.

1.2. Context and importance of this course in the degree

Each course of the degree aims at covering a field in the Technological and Scientific training of the student, in this case, the selection of a process. Success at completing this task will condition the viability of the product, both technically and economically.

Learning about the manufacturing processes and industrial activities connected to them is essential to run and manage a company or part of it.

It is important to be able to take part in the design of components suggesting improvements and alternatives, getting their skills better or getting to reach their goals more efficiently.

1.3. Recommendations to take this course

There are no particular requirements to take this course. However, the contents to be taken will require the skills and abilities acquired, mainly, in the subjects of Technical Drawing, Statistics, Physics, Mathematics and Materials Engineering.

2. Learning goals

2.1. Competences

The student will acquire generic and specific skills:

GI03: Knowledge of basic and technological subjects, which enables them to learn new methods and theories, and provides them with versatility to adapt to new situations.

GI04: Ability to solve problems with initiative, decision making, creativity, critical thinking and to communicate and transmit knowledge, abilities and skills in the field of Industrial Engineering and in particular in the field of industrial electronics.

GI06: Ability to manage mandatory specifications, regulations and standards.

GC02: Interpret experimental data, contrast them with the theoretical ones and draw conclusions.

GC03: Ability for abstraction and logical reasoning.

GC04: Ability for lifelong self-learning.

GC08: Ability to locate technical information, as well as its understanding and evaluation.

GC10: Ability to write technical documentation and present it with the help of appropriate computer tools.

GC14: Ability to understand the operation and develop the maintenance of mechanical, electrical and electronic equipment and installations.

GC15: Ability to analyze and apply simplified models to technological equipment and applications that allow predictions on their behavior.

GC17: Ability to correctly interpret plans and technical documentation.

IE09: Basic knowledge of production and manufacturing systems.

EM04: Applied knowledge of manufacturing systems and processes, metrology and quality control.

2.2. Learning goals

- Learn about material behavior and technology.

- Select and design the appropriate manufacturing process for a mechanical element.

- Preparation and interpretation of plans and diagrams based on the appropriate regulations and symbols.

2.3. Importance of learning goals

The successful choice of a production process is an objective of the subject that will undoubtedly contribute to improving the efficiency of the company. Having a critical attitude towards solutions already used, so that they motivate the student to deepen the study and analysis of the issues that are the objective of this course, favors the approach to new strategies and encourages innovation.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

- **Continuous assessment.**

The student must demonstrate that they have achieved the expected learning outcomes by evaluating the following activities:

Laboratory practice tasks: In each of the practice tasks the results obtained and the process followed will be evaluated. Once the practice is done, a report must be delivered according to the model. This activity is valued from 0 to 10 points. (This activity will be carried out in groups of 2/3 students, but the delivery is done individually). The final grade will be the average. Minimum score for each practice 3. Minimum score for the average 4.

Exercises and theoretical questions suggested: The teacher will suggest exercises, problems, practical cases, theoretical questions, or presentation tasks to be done individually or in groups accordingly. This activity handed in properly will be valued between 0 and 10 points. The final grade will come from the average of all the exercises. Each exercise will have to reach a minimum mark of 3. Minimum score for the average 4.

Written assessment tests: They will consist of a written exam (theory and problems) graded from 0 to 10 points. The final grade of this part will be given by the average of the tests, as long as there is no one graded below 4 points, in this case the part will be failed. Minimum average score 4.

As a summary of the aforementioned, the following weighting table of the grading process of the different activities, in which the continious assessment process of the course has been based, has been designed

ASSESSMENT ACTIVITY	WEIGHTING
Laboratory practice tasks	20%
Exercises and theoretical questions	10%
Written assessment tests	70%

After the weighting, the mark to pass the subject must be equal to or greater than 5

To opt for the Continuous Assessment System, you must attend at least 80% of the classroom activities.

In case of not succeeding with this system, the student will have two additional calls to do so (global assessment test).

If during the Continuous Assessment period some of the written Tests are not passed, they can be compensated in the global exam in February, using the Continuous Assessment system criteria.

- **Global assessment test.**

Following the regulations of the University of Zaragoza in this regard, in subjects that have continuous assessment systems, a global assessment test will be scheduled for those students who decide to opt for this second system. The global assessment activities are made up of:

Written exam: It will consist of a test that will contain questions and problems concerning the topics covered throughout the course. The grading of this test goes from 0 to 10 points (minimum score 5).

Laboratory practice exam: The student who has not passed the lab practical tasks carried out along the course will have to take a written exam about their content. This test will be graded from 0 to 10 points (minimum score 5).

Weight table for the global assessment:

Assessment task	Weight
Written exam	85%
Laboratory Practice Exam	15%

After the weighting, the mark to pass the subject must be equal to or greater than 5.

If the Laboratory Practices have been passed in the Continuous Assessment (with a mark equal to or greater than 5), this grade will be valid for the Global Assessment part, and the student will not have to take the Laboratory Practice exam.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

1. Lectures: Given to the whole group, basically given by the teacher, in such a way as to explain the theoretical supports of the subject.
2. Practice Sessions: The teacher solves problems or practical cases for illustrative purposes. This type of teaching complements the theory explained in the lectures with practical aspects.
3. Laboratory practice tasks. Students will carry out tests, measurements, joint assemblies, etc., in the workshop and in the laboratory in the presence of the trainee teacher.
4. Individual tutorials. On-site activities related to any issues of the subject at a specific agreed on time or via the Moodle virtual classroom.

The approach, methodology and assessment of this guide are intended to be the same for any teaching scenarios. They will be adapted to the social-health situation at any particular time, as well as to the instructions given by the authorities concerned.

4.2. Learning tasks

The course includes the following learning tasks:

- Lectures, practical lessons and Lab practice tasks. They will take place four hours per week, until the complenion of 60 hours necessary to cover the agenda.
- Lab practice tasks. They will be carried out in subgroups adapted to the room of laboratory.
- Study and personal work. This off-site part is given about 90 hours, necessary for the study of the theory, problem-solving and questionnaires, work production and revision of scripts.
- Tutorials and generic off-site activities. Each teacher will publish student service timetable throughout the four-month period.

4.3. Syllabus

The course will address the following topics:

THEORETICAL CONTENTS:

- **Topic 1. Metrology**. Introduction to Metrology. Measuring Instruments: Direct and indirect measurements. Surface roughness. Tolerances and Fittings.
- **Topic 2. Process Quality Control**. Process Capability Studies. Control Charts.
- **Topic 3. Molding.** Fundamentals of metal casting. Metal-casting Processes. Technical and economic considerations.
- **Topic 4. Joint and assembly processes.** Fusion welding processes. Solid-state welding processes. Metallurgy of welding, design, and tests. Brazing, soldering. Adhesive bonding. Mechanical fastening.
- **Topic 5. Machining.** Classification of machining processes. Non-conventional machining processes.

PRACTICAL CONTENTS:

Mechanical elements Measurements:
- Control of threads and gears. Measurement of angles and conicity.
- Verification of tolerances (dimensional and geometric) in axis, depths, distance between holes.
- Measurement and Sketching of a component.

Roughness: Evaluating different machined surfaces.
Practice tasks on welded and/or screwed joints:
Carry out a binding system in a practical way and report it.

4.4. Course planning and calendar

The lectures and problem lessons are taught in the timetable organized by the School, as well as the hours assigned to laboratory practice tasks.

In the Continuous Assessment system the dates of the written assessment tests will be posted on the Digital Teaching Platform (ADD) along the course.

The weekly schedule of the subject will be published at
http://www.eupla.unizar.es/asuntos-academicos/calendario-y-horarios

The dates of the global evaluation test (official calls) will be published at
http://eupla.unizar.es/asuntos-academicos/examenes

4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28821