

Academic Year: ( 2023 / 2024 )

Review date: 28-03-2023

Department assigned to the subject: Mechanical Engineering Department

Coordinating teacher: DIAZ ALVAREZ, JOSE

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 1

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

Engineering Graphics  
Machine Mechanics  
Materials science and engineering

**SKILLS AND LEARNING OUTCOMES**

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study

CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.

CG1. Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Industrial Engineering.

CG3. Ability to design a system, component or process in the field of Industrial Technologies to meet the required specifications

CG24. Basic knowledge of production and manufacturing systems.

RA1. Knowledge and understanding: Have basic knowledge and understanding of science, mathematics and engineering within the industrial field, as well as knowledge and understanding of Mechanics, Solid and Structural Mechanics, Thermal Engineering, Fluid Mechanics, Production Systems, Electronics and Automation, Industrial Organisation and Electrical Engineering.

RA2. Engineering Analysis: To be able to identify engineering problems within the industrial field, recognise specifications, establish different resolution methods and select the most appropriate one for their solution

RA3. Engineering Design: To be able to design industrial products that comply with the required specifications, collaborating with professionals in related technologies within multidisciplinary teams.

RA4. Research and Innovation: To be able to use appropriate methods to carry out research and make innovative contributions in the field of Industrial Engineering.

RA5. Engineering Applications: To be able to apply their knowledge and understanding to solve problems and design devices or processes in the field of industrial engineering in accordance with criteria of cost, quality, safety, efficiency and respect for the environment.

**OBJECTIVES**

Know the fundamentals of the production and manufacturing systems.

Know the theoretical bases of the technological processes and their application to the different techniques and manufacturing processes and to the joining processes of pieces.

To acquire the ability to increase this knowledge and apply it to the development of industrial projects related to production processes.

Apply quality controls of manufactured products.

**DESCRIPTION OF CONTENTS: PROGRAMME**

Chapter 1: Introduction.

Chapter 2: Manufacturing systems and processes.

Chapter 3: Costs and manufacturing times.

Chapter 4: Design for manufacturability.

Chapter 5: Automated production and manufacturing systems.

Chapter 6: Measurement, metrology and quality control techniques.

Chapter 7. Molding processes.

Chapter 8. Forming by plastic deformation: Introduction; Press machines; Sheet metal forming; Forging;

Extrusion; Lamination.

Chapter 9. Forming by chip removal (machining): Introduction; Machining times and costs; Turning; Milling; Boring; Grinding and other finishing processes.

Chapter 10: Manufacture of plastic products.

#### LEARNING ACTIVITIES AND METHODOLOGY

- Master classes (synchronous virtual sessions)
- Practical classes in reduced groups: problems and cases studies (face-to-face classes).
- Individual tutorships and personal student work.

- Laboratory practices: 4 sessions of 2 hours

To pass the subject it is compulsory to pass the laboratory practices, for which it is necessary to do them and obtain an APTO grade, or otherwise, to take an exam corresponding to the laboratory practices as part of the final exam of the subject, which will have a 30% weight in the final exam grade.

\* Practice 1: Sheet metal forming processes I: Press machines and sheet metal forming dies (part of the class, face-to-face in laboratory).

\* Practice 2: Machining processes: Cutting tools and CNC machine-tools (part of the class, face-to-face in laboratory).

\* Practice 3: Sheet metal forming processes II: Numerical Modeling (synchronous virtual session).

\* Practice 4: CAD-CAM, CNC programming (synchronous virtual session).

#### ASSESSMENT SYSTEM

Continuous Assessment (45%):

- 2 partial exams: 30% final grade.
- Work in groups of students: 15% final grade.

End-of-term-examination: 55% final grade (minimum value: 4/10).

To pass the subject it is mandatory to attend and carry out the laboratory practices obtaining an APTO grade.

<b>% end-of-term-examination:</b>	55
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	45

#### BASIC BIBLIOGRAPHY

- Grupo docente de fabricación (Dpto. de Ing. Mecánica de la UC3M) Production systems and manufacturing technologies teaching material, Edición interna.
- M.H. Miguélez, J.L. Cantero, J. Canteli, J.G. Filippone Problemas Resueltos de Tecnología de Fabricación, Thomson Paraninfo.
- Serope Kalpakjian Manufacturing Processes for Engineering Materials, Addison-Wesley Pub.

#### ADDITIONAL BIBLIOGRAPHY

- Hwaiyu Geng Manufacturing Engineering Handbook, McGraw-Hill .