

Academic Year: ( 2024 / 2025 )

Review date: 25-04-2023

Department assigned to the subject: Mechanical Engineering Department

Coordinating teacher: OLMEDA SANTAMARIA, ESTER

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 2

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

- Elasticity and strength of materials
- Mechanics of Structures

**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

CG8. Knowledge and ability to apply quality principles and methods.

CG24. Basic knowledge of production and manufacturing systems.

ECRT4. Applied knowledge of manufacturing systems and processes, metrology and quality control.

ECRT5. Knowledge and skills for the calculation, design and testing of machines.

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

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**

- Acquire an overview of the working methods used in mechanical design.
- Form criteria on the selection of materials, application of failure theories, choice of the safety factor and, in general, of the factors that influence the design and dimensioning of the elements and enable decision making.
- To know the concept of tribological phenomenon and its industrial solutions.

**DESCRIPTION OF CONTENTS: PROGRAMME**

1. Design for static strength. Failure theories.
2. Design by fatigue.
  - 2.1 Fatigue's theory (Goodman, Soderberg, Gerber)

- 2.2 Shaft theory
- 3. Gears
- 3.1 Gear transmission calculation
- 3.2 Gear fatigue
- 4. Tribology and Lubrication.
- 5. Roller bearings
- 6. Belts transmission calculation
- 7. Springs
- 8. Brakes and clutches
- 8.1 Drum brakes
- 8.2 Disc brakes
- 8.3 Clutches

## LEARNING ACTIVITIES AND METHODOLOGY

- Master classes and, where appropriate, classes to resolve doubts in small groups, presentations of students, individual tutorials and personal work of the student, aimed at acquiring theoretical knowledge.
- Lab practices and problem classes in small groups, individual tutorials and personal work of the student; oriented to the acquisition of practical skills related to the program of the subject.
- Group work: selection of a machine and calculation of its elements. Group tutorials, presentation of group report and individual questions.

## ASSESSMENT SYSTEM

<b>% end-of-term-examination:</b>	40
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	60

The student will be assessed according to the Bologna criteria. Specifically, the continuous evaluation will be carried out by means of a four-monthly work, as well as a final examination. Continuous assessment cannot be made up.

In the ordinary call, in order to pass the subject, the student must obtain a total score equal to or greater than 5, having to obtain in the final exam a minimum score of 4 out of 10.

Percentage weight of the Final Exam: 40%.

Percentage weight of the rest of the continuous evaluation: 60%.

The accomplishment and overcoming of the practices of laboratory is obligatory to approve the subject.

In the extraordinary exam of Machine Technology subject, the student examines the whole course. The grade of the exam of each student will be the best between:

- The grade achieved in the extraordinary exam. The minimum grade to pass is 5.0.
  - The grade computed by the sum of the grades of the continuous evaluation (60%) and the extraordinary exam (40%).
- In this case, a minimum of 4 points out of 10 is required in the extraordinary exam. The minimum grade (the sum) to pass is 5.0.

In addition, those students who have not passed the laboratories have to take an exam. If this exam is failed, the extraordinary exam will be also FAIL.

## BASIC BIBLIOGRAPHY

- Bernard J. Hamrock et al Elementos de máquinas, McGraw-Hill, 2000
- J.I. Pedrero TECNOLOGÍA DE MÁQUINAS (TOMO 1), UNED.
- R. Aviles Análisis de fatiga en máquinas, Thomson, 2005
- Richard G. Budynas y J. Keith Nisbett Diseño en ingeniería mecánica de Shigley, Mc Graw Hill, 2008

