Universidad Zaragoza

Academic Year/course: 2024/25

39624 - Machines: Calculus and Design

Syllabus Information

Academic year: 2024/25
Subject: 39624 - Machines: Calculus and Design
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 608 -
ECTS: 6.0
Year: 3
Semester: First semester
Subject type: Compulsory
Module:

1. General information

The objective is to train the student to be able to design machine elements through the failure criteria, and to select the optimal materials for the design of an element.

2. Learning results

The student, in order to pass this subject, must demonstrate the following results...

- Select the most suitable material or treatment for the application.
- Model or solve the drive mechanisms of subassemblies or mechanical machines, from drawings or specification notebooks.
- Dimension mechanical elements according to specifications.
- Design or analyze, using computer tools; the behavior of parts, subassemblies or systems, against established systems, against established stresses or performance requirements.
- To perform the kinematic and kinetic analysis of mechanical assemblies, machines and mechanisms analytically or by means of numerical simulation, analyzing the results obtained.
- Calculate and design structural elements subjected to loads.
- Drawing and interpretation of plans and diagrams according to the appropriate standards and symbology.

3. Syllabus

Contents

The theoretical contents are articulated on the basis of three didactic units, as shown in the table below.

Topic 1. Static Resistance Design

1.0. Review of straight beams and element design

1.1. Curved beams

1.2. Variable section beams

1.3- Contact stresses

1.4- Voltage concentrators

1.5. Theories of failure for static loading

Topic 2. Dynamic Strength Design

2.1. Dynamic loads

2.2. Impact load design

2.3. Fatigue strength design

Topic 3. Fasteners and transmission elements

3.1. Gears

3.2. Axles and shafts

3.3. Screws and bolts

4. Academic activities

The planned activities are:

- **Theoretical classes**: taught in a fundamentally expository manner by the professor.

- **Practical classes**: The teacher solves problems or practical cases.
- **Individual tutoring**: through personalized attention with the teacher. They can be face-to-face or virtual.

The distribution of the subject will be as follows:

- 54 hours of class with 20% of theoretical exposition and 80% of problem solving.
- 6 hours of written evaluation tests, at a rate of two hours per test.
- 90 hours of personal study, spread over the 15-week semester.

5. Assessment system

Two options:

1. CONTINUOUS ASSESSMENT

It is mandatory to attend at least 80% of the classes.

Qualifying activities:

- **Exercises, theoretical questions and proposed works**: The professor will propose exercises, problems, practical cases , theoretical questions, etc. to be solved individually. It represents a 10% of the final grade of the subject.
- **Written tests**: The tests will include theoretical and/or practical questions. There will be 3 tests spread over the semester . It represents 90% of the final grade of the subject. The final score will be the average arithmeticmean of the three tests, being the minimum grade for each of them 4 out of 10 to pass.

Prior to the first call, the teacher of the subject will notify each student whether or not they have passed the subject based on the use of the split evaluation system, based on the sum of the marks obtained in the different activities obtained in the different activities developed throughout the course, each of them contributing a minimum of 50% minimum of 50%.

2. GLOBAL ASSESSMENT

Qualifying activities:

- **Written exam:** single test of resolution of exercises of theoretical and/or practical application. It is a 100 % to the final grade of the course.

6. Sustainable Development Goals

5 - Gender Equality
9 - Industry, Innovation and Infrastructure