

60815 - Machine Design Criteria

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	532 - Master's in Industrial Engineering
ECTS	6.0
Course	1
Period	First semester
Subject Type	Optional
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

- Undertand the mechanical design requirements
- Design criteria to develop components or mechanical assemblies.
- Machine elements performance characterization.
- Critical analysis of solutions for components and mechanical assemblies.

2.2.Introduction

Machine Design Criteria is a compulsory subject of 6 ECTS credits, which means 150 work hours, corresponding to 60 hours of presential lessons (theory, problems, CAD laboratory...) and 90 hours of non-presential learning (Mentored practical assignments, personal study time).

The subject focuses on these main contents:

- Design criteria to develop components or mechanical assemblies.
- Machine elements performance characterization.
- Critical analysis of solutions for components and mechanical assemblies.

60815 - Machine Design Criteria

3.Context and competences

3.1.Goals

The subject and its learning outcomes are aligned with the following approaches and aims:

The content of machine design criteria focuses on two main points: On the one hand obtaining knowledge about different design criteria for components or mechanical assemblies and applying them; on the other hand being able to identify and characterize the most common machine elements with a critical point of view.

Within the first point, the importance of applying a proper design methodology to consider all the relevant factors that influence mechanical design is shown. Within the second, the student will understand the behavior of each elements in a mechanical assembly, whether it is part of a joint or a transmission, being able to identify and calculate the different loads involved and assess design alternatives

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

There are four methodologies used to face the subject: master classes, study cases, practical sessions and mentored working.

- Master classes include exposition of theoretical contents related to mechanical design criteria and mechanical elements characterization. The exposition is supported by different examples from real industrial cases.-

- Study cases sessions are thought to solve different exercises and standard problems.

- Practical sessions will be carried out in small groups where students will use test benches, different mechanical assemblies and the software required for proposed exercises.

- Mentored works will consist of different tasks made under teacher supervision.

5.2.Learning activities

5.2. Learning activities

The following activities included in subject program are offered to the students to help them achieved the required learning outcomes:

60815 - Machine Design Criteria

Type 1 Teaching: Theory classes (30 hours). Theory classes of machine design criteria and characterization of machine elements. These classes are based on explaining theoretical concepts by means of common teaching resources. (Power Point presentations...).

Type 2 Teaching: Exercises classes Docencia tipo 2: Clases de problemas (15 hours). Exercises classes of machine design criteria and characterization of machine elements. These classes are based on showing and solving problems and case studies by means of common teaching resources. (Power Point presentations...)

Type 3 Teaching: Laboratory practices (12 hours). Practical lessons of Mechanical Design and Machine Elements. They are based on the explanation of exercises and a personal attention to the students to guide them in solving the exercises.

Type 6 Teaching: Mentored practical assignments (23 hours). Mentored practical assignments are work that the students carry out in small groups with the guidance and supervision of the teacher. At the end of the assignment, it will be presented by the students.

Type 7 Teaching: Personal study time . Individual study time needed to consolidate a proper learning process.

Type 8 Teaching: Assessment. In addition to the qualifying function, the assessment is also a learning tool as the students check their degree of understanding of the subject.

Other activities: Tutorial sessions . Direct student help, learning problems identification, guidance with the subject, help with exercises and assignments

5.3.Program

The planned subject program is:

- Design methodology
- Analysis of the influence of the manufacturing process on the design
- Tolerances and design
- Other factors in mechanical design: Load types, drives, materials...
- Stiffness-based design
- Design based on weight and volume criteria
- Other design criteria: Assembly, transportation...
- Characterization of joining, transmission, conversion and other elements in machines

60815 - Machine Design Criteria

- Characterization of other machine elements

The programmed laboratory practices are:

1. Functional analysis of the tolerances of a machine
2. Machine assembly and disassembly methodologies.
3. Injected plastic components design criteria.
4. Comparison of several mechanical designs for the same function.
5. Theoretical and experimental spring analysis.

5.4.Planning and scheduling

An schedule for master classes, problem solving classes and practical sessions will be deliver before the beginning of the academic course and it could be consulted in the EINA website.

The rest of activities will be planned during the year and students will be informed an advance.

5.5.Bibliography and recomendaded resources