# 30016 - Machine Design Criteria

**Información del Plan Docente**

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| **Academic Year** | 2016/17 |
| **Academic center** | 110 - Escuela de Ingeniería y Arquitectura |
| **Degree** | 436 - Bachelor's Degree in Industrial Engineering Technology |
| **ECTS** | 6.0 |
| **Course** | 2 |
| **Period** | Second semester |
| **Subject Type** | Compulsory |
| **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

## 2.2.Introduction

**Brief subject presentation**

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.

## 3.Context and competences

## 3.1.Goals

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

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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

BASIC COMPETENCES

CB01. Students have demonstrated knowledge and understanding in a field of study that is part of the general secondary education curricular, and is typically at a level which, although it is supported by advanced textbooks, includes some aspects that involve knowledge of the forefront of their field of study.

CB02. Students can apply their knowledge to their work or vocation in a professional manner and have competences typically demonstrated through devising and defending arguments and solving problems within their field of study.

CB03. Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include an important reflection on social, scientific or ethical issues.

CB04. Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

CB05. Students have developed those skills needed to undertake further studies with a high degree of autonomy.

GENERAL COMPETENCES

CG1 Ability to create, design and develop Industrial Engineering projects.

GC2. Ability to plan, budget, organize, direct and control tasks, people and resources.

CG3 - Ability to combine basic and specialized knowledge in Industrial Engineering to create innovative and competitive

proposals in the professional field.

CG4 - Ability to solve problems and make decisions with initiative , creativity and critical thinking.

CG5 - Ability to applyTICs in Industrial Engineering.

CG6 - Ability to communicate and transfer knowledge, abilities and skills in Spanish.

CG7. Ability to use techniques, tools and skills of Industrial Engineering for its practice.

GC8. Ability to analyze and assess social and environmental impact of technical solutions, acting with ethics, professional responsibility and social commitment.

GC9. Ability to work in multidisciplinary groups into a multilingual environment.

GC10. Ability to manage information and apply regulations and procedures required for Industrial Engineering.

CG11 - Ability to learn in a continuos way and develop self-learning strategies.

SPECIFIC COMPETENCES

CE13. Ability to apply machine and mechanisms design basis

## 3.4.Importance of learning outcomes

## 4.Evaluation

## 5.Activities and resources

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## 5.1.General methodological presentation

## 5.2.Learning activities

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

**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** (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 Desing 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 thetecaher. At the end of the aassigment, 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 qualifiying funtion, the assessment is also a learning tool as the students check their degree of understansding 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

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- Design based on weight and volume criteria

- Other design criteria: Assembly, transportation...

- Characterization of joining, transmission, conversion and other elements in machines

- 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

## 5.5.Bibliography and recomended resources