Universidad Zaragoza

**Academic Year/course: 2023/24**

# 66434 - Advanced mechanical CAD

## Syllabus Information

**Academic year:** 2023/24
**Subject:** 66434 - Advanced mechanical CAD
**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura
**Degree:** 536 - Master's in Mechanical Engineering
**ECTS:** 4.5
**Year:** 1
**Semester:** Second semester
**Subject type:** Optional
**Module:**

## 1. General information

Objectives of the subject

The main objective of the subject is to provide students with the necessary skills for the proper use of 3D mechanical CAD applications for the design and development of mechanical components and assemblies. This will help them to assimilate the work methodologies common to all the applications. They will also be able to take advantage of the possibilities of parameterization and associativity with CAM/CAE applications as support for the optimization of mechanical products. Likewise, the potential of 3D CAD techniques for planning manufacturing systems that produce functional and aesthetic products is explored. In addition, the student will be trained to determine what level of 3D CAD application should be used for their mechanical engineering projects and how to take advantage of its potential to improve the design and development of products and their manufacturing methods.

https://www.un.org/sustainabledevelopment/es/):Sustainable Development Goals of the 2030 Agenda (https://www.un.org/sustainabledevelopment/es/): Goal 8: Target 8.2; Goal 9: Target 9.4; Goal 12: Target 12.5

Recommendations to take the subject.

It is advisable to have computer equipment, preferably a laptop, in order to install the CAD/CAM applications that will be used in class and at home.

## 2. Learning results

1. To apply optimized advanced 3D mechanical CAD techniques to mechanical assemblies such as machinery, appliances, and car parts.
2. To complete the design and development cycle of structural and aesthetic mechanical components, from conceptual design to the development of forming tools.

## 3. Syllabus

Topics

Block 1. 3D modeling techniques for the design of structural and aesthetic mechanical components:

Parametric solid modeling

Synchronous modeling

Surface Modeling

Block 2. Design and development of mechanical assemblies:

Parameterization and associativity. Verification.

Component libraries

Specific modules for the design of metal components and structures

Block 3. Design of forming tools and CAM

3D CAD design methodologies for tools and fixtures for manufacturing processes

CAMD: Specific applications for the design of shaping tools (molds, dies) and EDM electrodes.

CAM: Work methodology for milling plate-type pieces and components that require surface machining.

Block 4. Generative design and reverse engineering.

Generative design and concurrent modeling

Obtaining and processing point clouds.

CAD tools for repairing and editing STL files.

## 4. Academic activities

Learning is based on understanding the working methodologies with 3D mechanical CAD/CAM for the design and development of different types of mechanical systems. They are assimilated through their application to technical cases and subject projects, which are recommended to be integrated with the works of other subjects. In order to achieve this, access to commercial applications will be facilitated.

- Master class and technical cases: 12 hours
- Practices and supervised sessions: 33 hours
- Personal work: 65 hours
- Assessment: 2.5 hours

## 5. Assessment system

The subject is preferably proposed with a **continuous evaluation** consisting of three practical works/projects.

1.- Modeling work of mechanical parts and assemblies (60%).

2.- Reverse engineering and concurrent design work (20%).

3.- Work on modeling of forming tools and 3D CAM (20%).

To average the activities of continuous assessment, a minimum grade of 4.0 is required in each of them. Otherwise, the corresponding test must be carried out in the global evaluation.

The student has also the possibility to pass the subject by the global assessment method in the official calls. The assessment will be done thorug the practical tests on the dates set by the centre.