Course guide
320143 - DAO - Computer-Aided Design

Last modified: 11/04/2025

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 717 - DEGD - Department of Engineering Graphics and Design.
712 - EM - Department of Mechanical Engineering.

Degree: BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2010). (Compulsory subject).

Academic year: 2025 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Joan Antoni López

Others: Joan Antoni López, Jordi Sans

PRIOR SKILLS

In order to follow the content of the course, students should have some experience in the use of three-dimensional CAD and also having achieved basic knowledge related to mechanical resistance materials and common manufacturing processes.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CED27-DIDP. Knowledge of advanced 3D modeling. (Specific technology module: industrial design)
CED28-DIDP. Knowledge of basic 3D animation and simulation. (Specific technology module: industrial design)
CED60-DIDP. Practical knowledge of complex component and product design and development. (Specific technology module: Industrial Design)
CED61-DIDP. Practical knowledge of product detail design. (Specific technology module: Industrial Design)

Generical:
CG01-DIDP. Ability to conceive, develop, understand and execute the product design process, within a necessary balance between technical and socio-cultural context, responding to the needs of the company, the market, society and users.

TEACHING METHODOLOGY

Based learning in individual and small group sessions and theory groups.

LEARNING OBJECTIVES OF THE SUBJECT

The use of new technologies in engineering is increasing on the industry, the geometry modelling
complex and specific quality characteristics, the finite element calculation, simulation of mechanisms, computer aided manufacturing tools, automatic calculation...are usually used in industry, and therefore necessary product design decisions.
The objectives of the course are:
· Understand the theoretical and practical issues.
. Become familiar with the computer programmes related with course
. Become familiar with the working methods of engineering: today fully integrated in the industrial environment.
. Able to understand, translate or model a problem of the industry.

STUDY LOAD

Type	Hours	Percentage
Hours large group	15,0	10.00
Hours small group	45,0	30.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

Topic 1 :CAD

Description:
· INTRODUCTION
1. CAD Tools in the different phases of product development
2.CAD systems history
3.Classification of CAD systems
4.Selection of CAD systems.
5. Design methods
6.Cicle product life
· GEOMETRIC MODELS
Solids: Wireframe / Boundary / Constructive Geometry / Volumetric
2.Superfícies and curves: polygon meshes / Bezier / Splines / Nurbs
3.Superfícies analytical / quadratic / Patches
3.Treball with point clouds
· DATA QUALITY CAD
1. Problems in data quality
2.Quality Organizational / Functional
3.Continuity tangency / curvature / Class A
4. Geometry and process manufacturing
· DATA EXCHANGE
1.Integration of CAD systems
2.Native Formats
3.Neutral Formats

Related activities:
AVCAD1, AVCAD2

Full-or-part-time: 50h
Theory classes: 5h
Laboratory classes: 15h
Self study : 30h

TOPIC 2: CAM

Description:
· Introduction to machining
· CNC machines. Typology and Overview.
· Milling machine operations
· Programming languages. ISO and conversational. Post - processing.
· Preliminary use of CAM tools, raw material,
· Using a CAM 2.5 D (SOLID CAM)
· Using a 3D CAM (SOLID CAM)
· New trends in machining: IMACHINING SOLID CAM. (optimized path, constants efforts)
· Introduction to CAM 5D (SOLID CAM). Simulation of machinery.

Related activities:
AVCAM1

Full-or-part-time: 50h
Theory classes: 5h
Laboratory classes: 15h
Self study : 30h

TOPIC 3: CAE

Description:
· Kinematics Simulations
· Dynamics Simulations
· Static FEA Simulations
· FEA simulations. Fatigue
· FEA Simulations. Thermal problems

Related activities:
AVCAE1, AVCAE2,AVCAE3

Full-or-part-time: 50h
Theory classes: 5h
Laboratory classes: 15h
Self study : 30h

ACTIVITIES

AVCAD1: INDIVIDUAL CAD WORK

Full-or-part-time: 6h
Laboratory classes: 6h

AVCAD2: GROUP CAD WORK

Full-or-part-time: 18h
Self study: 9h
Laboratory classes: 9h

AVCAM1: WORKING WITH MILLING

Full-or-part-time: 15h
Laboratory classes: 15h

AVCAE1: CIN AND DIN SIMULATION

Full-or-part-time: 6h
Self study: 3h
Laboratory classes: 3h

AVCAE2: STATIC AND FATIGUE FEA

Full-or-part-time: 6h
Self study: 3h
Laboratory classes: 3h

GRADING SYSTEM

The evaluation of knowledge, skills and abilities is made from:
- Deliveries scheduled AVCAD1, AVCAD2, ...33%
- Deliveries scheduled AVCAM1..... 33%
- Deliveries scheduled AVCAE1, AVCAE2, AVCAE3 ..... 34%

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.
If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

EXAMINATION RULES.

The realization and delivery of planned activities is mandatory in order to obtain a continuous assessment rating.