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320143 - DAO - Computer-Aided Design

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering

Teaching unit: 717 - EGE - Department of Engineering Presentation
712 - EM - Department of Mechanical Engineering

Academic year: 2019

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

ECTS credits: 6 Teaching languages: Catalan

Teaching staff

Coordinator: 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

Transversal:

1. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.
2. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
3. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.

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.

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Study load

Total learning time: 150h	Hours large group:	15h	10.00%
	Hours medium group:	0h	0.00%
	Hours small group:	45h	30.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

Topic 1 :CAD

Learning time: 50h

Theory classes: 5h
Laboratory classes: 15h
Self study : 30h

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

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TOPIC 2: CAM	Learning time: 50h Theory classes: 5h Laboratory classes: 15h Self study : 30h

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

TOPIC 3: CAE	Learning time: 50h Theory classes: 5h Laboratory classes: 15h Self study : 30h

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

Related activities:
AVCAE1, AVCAE2,AVCAE3

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Planning of activities

AVCAD1: INDIVIDUAL CAD WORK	Hours: 6h Laboratory classes: 6h
AVCAD2: GROUP CAD WORK	Hours: 18h Laboratory classes: 9h Self study: 9h
AVCAM1: WORKING WITH MILLING	Hours: 15h Laboratory classes: 15h
AVCAE1: CIN AND DIN SIMULATION	Hours: 6h Laboratory classes: 3h Self study: 3h
AVCAE2: STATIC AND FATIGUE FEA	Hours: 6h Laboratory classes: 3h Self study: 3h

Qualification 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.

Regulations for carrying out activities

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

Bibliography