

Centre	University College of Engineering of Vitoria-Gasteiz
Name of subject	26043 – Graphic Expression Extension
Qualification	Degree in Mechanical Engineering
Type	Compulsory
Credits	6 ECTS
Year	3
Term(s)	1st
Department	Graphic Expression and Engineering Projects
Language	Spanish and Basque

Outcomes / Objectives

Brief description of content

Introduction to Industrial Design. Applications of Mechanical Engineering Drawing. Specific Mechanical Drawing CAD applications.

Specific outcomes

Have thorough knowledge of the fundamentals and methodological basis of Industrial Design with a view to participating, through the analysis and application of such knowledge, in the definition and implementation of mechanical engineering projects.

Expand knowledge with the cataloguing and supplementary analysis of standardisation in the field of Graphic Engineering, through its correlation and adaptation to other associated Mechanical Engineering fields.

Properly define, through their design and representation, the models for non-standardised and standardised parts of any mechanical device, by correlating the requirements associated with function, manufacture, assembly, maintenance and recycling.

Have knowledge of, select and optimally manage and share the different CAD applications in order to provide a committed and responsible answer to the case studies proposed, providing logical, coherently reasoned and presented solutions.

Objectives

Produce and interpret standardised drawings, carry out assignments and prepare written and oral reports: use specific vocabulary, forms of representation and terminology to correctly express theoretical knowledge, solution methods, results and aspects related to structural design, equilibrium of a deformable body, structural systems, machine design, manufacturing processes, hydraulic machines and thermal engineering.

Formulate ideas, discuss and make decisions in the group assignments completed in the field of mechanical engineering disciplines.

Develop designs and undertake projects in the field of industrial buildings, hydraulic machinery and their facilities, and machine design.

Apply legislation, specifications and enforceable rules and regulations in the field of mechanical engineering.

Syllabus

Unit 1

- Fundamentals and methodological basis of Industrial Design
- Areas of development and application of Industrial Design. Industrial Design in Engineering. Design Engineering and its association with Manufacturing Engineering, Process Engineering, and production management.

Unit 2

- Design tools and graphic engineering applications in the context of process and product engineering PLM solutions.
- Study of relationships, geometric requirements and design and modelling applications for the different PLM solutions: Reverse engineering, Finite Element Analysis, Virtual Reality, Computer Aided Testing, Rapid Prototyping, Control Aided Manufacturing, etc.

Unit 3

- Mechanisms. Design of non-standard parts and their standardised representation.
- Formal and dimensional design associated with function. Materials.
- Definition of the precision thresholds required in manufacturing processes in terms of compatibility with function, in the formal and dimensional areas, normal numbers and mechanical surface state.

Unit 4

- Specific mechanical design CAD applications.
- CAD modelling (Parametric, variational, feature-based CAD models)
- Solid modelling (extension). Constructive solid geometry. Boolean operations. CSG structure. Solid-surface integration. Basic surfaces. Primitives.
- Mechanical assemblies (extension). 3D model management: control tools. Structuring, external references. Databases.
- Creating drawings. Formal, dimensional, normative definition. Process associativity and automation.

Methodology

Teaching Method

Face-to-Face Teaching Hours

Lectures	Seminars	Classroom practice	Lab. practice	Computer sessions	Clinical practice	Workshops	Industrial workshops	Field practice
30				30				

Student Hours of Non Face-To-Face Activities

Lectures	Seminars	Classroom practice	Lab. practice	Computer sessions	Clinical practice	Workshops	Industrial workshops	Field practice
45				45				

Assessment System

General criteria

- Written essay exam
- Practical tasks (exercises, case studies or problems)
- Group assignments

Compulsory materials

- Theoretical-practical documentation (lecturer's notes) of the subject available through the virtual platform and/or reprographic service.
- Basic Bibliography.
- Computer.
- Drawing tools.

Bibliography

Basic Bibliography

- AENOR Normas UNE sobre Dibujo Técnico. Tomo 3 Normas Fundamentales. AENOR 823 páginas ISBN-84-8143-053-8
- Brusola, F.; Calandin, E.; Baixauli, J. y Hernandis, B. ACOTACIÓN FUNCIONAL. Ed. Tebar Flores, Madrid (1986).
- DASSAULT SISTEMES User's Guide Part Design / Wireframe and surfaces / Assembly dressing / Generative drafting / CATIA.V5 2008
- FELEZ, Jesús; MARTINEZ M. Luisa. Ingeniería Gráfica y diseño. Madrid. 1ª Edición. (Editorial Síntesis 2008).867 páginas. ISBN 978-84-975649-9-1
- TORRECILLA INSAGURBE, EDUARDO. "El gran libro de CATIA". Editorial Marcombo. Barcelona 2010.

In-depth Bibliography

- CHEVALIER, A. "Dibujo Técnico" Limusa Noriega Editores 1.997.
- FRENCH, T., VIERCK, CH. "Dibujo de Ingeniería". Editorial McGraw Hill. México, 1977
- PROFESORES DEL DPTO. DE EXPRESION GRAFICA. Escuela Universitaria de Ingeniería de Vitoria-Gasteiz. Apuntes de Teoría y Prácticas de Expresión Gráfica y de CAD. 2011
- UNE. Cd Rom de Normas UNE sobre Dibujo. 4ª edición. Edita AENOR. Madrid, 2009.

Magazines

- Contactmag. Dassault systemes
- <http://www.develop3d.com/>

Websites

- www.aenor.es
- www.iso.org
- www.3ds.com
- www.abgam.es
- <http://revista.robotiker.com/revista/index.jsp>