Centre	**University College of Engineering of Vitoria-Gasteiz**
Name of subject	**25976 – Graphic Expression**
Qualification	**Degree in Industrial Chemical Engineering**
Brief description of the subject content	**Methods and techniques of graphical representation applied to constructive geometry. Standardisation. Computer aided applications.**
Type	**Compulsory**
Credits	**9 ECTS**
Year	**1**
Term(s)	**1st and 2nd**
Department	**Graphic Expression and Projects in Engineering**
Language	**Spanish and Basque**

Outcomes / Objectives

Objectives: To establish the scientific and regulatory basis of graphical representation in the general context of Industrial Engineering, as a means of expression and communication for the design, creation, definition and development of an industrial installation and/or product making practical use of the current technological means available, consistent with the scientific teaching framework and in response to technological evolution.

Outcomes: Use their capacity of vision to interpret and/or convey the technical information in an industrial drawing. Know and be able to apply graphical representation techniques using traditional metric geometry and descriptive geometry methods. Know, identify, interpret and apply the current standards on Industrial Technical Drawing. Computer aided design applications that allow students to elaborate and use graphical and technical information.

Syllabus

1. INTRODUCTION TO STANDARDISATION: Formats. Scales. Lines. Lettering.
2. ANALYSIS OF CORPOREAL FORMS. Formal definition. Constructive geometry. Main, basic, complementary and auxiliary views. Internal and external visualisation.
3. DIMENSIONING. Defining dimensions. Definition of functional, manufacturing, verification and geometric dimensions.
4. DIMENSIONAL AND GEOMETRIC TOLERANCES. Definition of dimensional and geometric error.
   Standardised adjustments. Form, position and runout tolerances.
5. MECHANICAL SURFACE STATE. MATERIALS. TREATMENTS. Roughness types.
6. HOLDING SYSTEMS. Disassemble and non-disassemble.
7. MOTION TRANSMISSION AND TRANSFORMATION ELEMENTS. Cogs. Friction and chain wheels. Belts and pulleys. Springs. Bearings. Cams and eccentric cams.
8. MECHANICAL ASSEMBLIES. Areas of Mechanical Engineering, Electrical Engineering, and Industrial Chemical Engineering.
   Assembly and exploded view drawings. Symbols.
9. INTRODUCTION TO COMPUTER AIDED DESIGN. CAD/CAM/CAE/CIM
10. INTRODUCTION TO A CAD SYSTEM: CATIA. Catia V5 environment.
11. SOLID 3D MODELLING. OBTAINING 2D DRAWINGS. ASSEMBLY OF MECHANICAL ASSEMBLIES. CAD PRACTICE. Catia V5 Sketcher, Part, Generative Drafting, Product and Assembly Modules.

Methodology

Teaching Method

Face-to-Face Teaching Hours								
Lectures	Seminars	Classroom practice	Lab. practice	Computer sessions	Clinical practice	Workshops	Industrial workshops	Field practice
45	0.0	30		15				

Student Hours of Non Face-To-Face Activities								
Lectures	Seminars	Classroom practice	Lab. practice	Computer sessions	Clinical practice	Workshops	Industrial workshops	Field practice
	0.0							

Assessment System

General criteria

1. Written essay exam
2. Practical activities (exercises, cases or problems)
3. Individual projects
4. Team projects.

Clarification regarding assessment

Continuous assessment of student work and learning outcomes (individual and team assignments, face-to-face and non face-to-face).

Exams: 60%.

Laboratory reports. Supervised assignments (More complex projects under teacher supervision): 30%.

Deliverables (questions, problems, projects...): 10%

Portfolio

Bibliography

Basic Bibliography

- Apuntes de Teoría y Prácticas de Expresión Gráfica. Profesores del Departamento de Expresión Gráfica. Escuela Universitaria de Ingeniería de Vitoria-Gasteiz. 2010
- FELEZ, Jesús; MARTINEZ M. Luisa. Ingeniería Gráfica y diseño. Madrid. 1st Edition. (Editorial
- Síntesis 2008). 867 pages. ISBN 978-84-975649-9-1
- Normas UNE de Dibujo Técnico (3rd edition) Cd-rom. AENOR. 2005.
- Notes on 3D Modelling and CAD Practice. Teachers of the Department of Graphic Expression. University College of Engineering of Vitoria-Gasteiz. 2010
- DASSAULT SISTEMES Users Guide Part Design / Wireframe and surfaces / / Assembly design / Generative drafting /CATIA V5 2008

In-depth Bibliography

- GONZALEZ GARCIA, V., LOPEZ POZA, R., NIETO OÑATE, M. Sistemas de Representación. Sistema Diédrico, Tomo I. Editorial: Texgraf. Valladolid, 1977.
- Dibujo Industrial. Chevalier, A. 1998.
- Dibujo de Ingeniería. (Part 1 and 2). Zorrilla, E. ; Bermejo, M. 1987.
- Normalización Básica. Dibujo Técnico. Zorrilla, E. ; Muniozguren, J. 1995.
- El Libro de Catia V5. Del Río Cidoncha, Mª Gloria; Martínez Lomas, Mª Eugenia; Martínez Palacios, Juan Martínez;Pérez Díaz, Silvia. Ed. Tébar 2007.

Websites

- www.aenor.es
- www.iso.org

- www.abgam.es