



Course guide

240028 - 240028 - Engineering Drawing I

Last modified: 15/06/2023

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 717 - DEGD - Department of Engineering Graphics and Design.

Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Villa Sicilia, Maria Arantzazu

Others: Fernandez Sanchez, Joaquin
Alsina Torrent, Jose Maria
Lopez Perez, Bruno
Semeraro, Nunzia Alessandra
Juan Colas, Maria Salud Montserrat
Monguet Fierro, Jose Maria
Mataró Villacampa, Joan
Robert Rincón, Miguel

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CE5. Spatial vision capacity and knowledge on graphic representation techniques, both with traditional methods of metrical geometry and descriptive geometry, and by means of computer aided design applications.

Generalical:

CGGTI 3. (ENG) Coneixement en matèries bàsiques i tecnològiques que capacitin per a l'aprenentatge de nous mètodes i teories, i doti de versatilitat per adaptar-se a noves situacions.

Basic:

CBGTI1. (ENG) Que els estudiants hagin demostrat posseir i comprés coneixements en una àrea d'estudi que parteix de la base de l'educació secundària general, i se sol trobar a un nivell què, si bé es recolça em llibres de text avançats. inclou també alguns aspectes que impliquen coneixements procedents de la vanguardia del seu camp d'estudi.

TEACHING METHODOLOGY

Learning based on practical realization. The exposition of theoretical concepts and procedures is combined with the resolution of exercises and the realization of a work.

The face-to-face sessions are held in computer rooms at the rate of one computer per student, with the support provided by industrial design CAD software. There are two types of sessions:

- Individual resolution of exercises with the help of the teacher, where the theoretical concepts and procedures taught are applied.
- Realization and follow-up of a work done in a group of 2 or 3 people.

The student has the possibility to legally and free of charge install the CAD program. This allows one to complete the work done in class, assimilate the theoretical concepts, carry out group work and solve the proposed exercises.



LEARNING OBJECTIVES OF THE SUBJECT

The main objective of the course is:

Strengthen and develop the capacity for three-dimensional spatial conception. Introduce the concepts and methodologies of the area of Graphic Engineering.

Specific objectives:

- Acquire a basic knowledge of industrial graphic language, both at the reading and execution level (graphic language conventions) and the presentation of graphic documentation.
- Expand knowledge of spatial metric geometry.
- Identify the form-function relationship of a certain object or mechanism and apply it to its design and/or modification.

STUDY LOAD

Type	Hours	Percentage
Hours medium group	60,0	40.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

Standardization of industrial drawing

Description:

Technical Drawing. ISO and AENOR normalisation. Formats. Scales. Orthogonal and auxiliary views. Partial and interrupted views. Details. Dimensioning. Cuts and sections: types. Threads.

Full-or-part-time: 8h

Practical classes: 4h

Self study : 4h

3D Modelling from reading normalised dihedral representations of a part and assembly modeling.

Description:

Exercises which intend to introduce students in using 3D CAD software (Procedures. Tools. Concepts. Strategies) while they learn how to read normalised dihedral representations and interpreting them.

Full-or-part-time: 28h

Practical classes: 12h

Self study : 16h

Normalized graphic representation of parts and assemblies from 3D models.

Description:

The student has to decide, according to his own criteria, which are the views, sections, axes, dimensioning, etc. necessary and sufficient to represent a part or assembly. The 2D drawing tools are taught with the program and the concepts learned in topic 1 are applied.

Full-or-part-time: 24h

Practical classes: 8h

Self study : 16h



Introduction to industrial design

Description:

Industrial design methodology. Form-function. Introduction to standardized mechanical components and their representation. It delves into positional relationships (Mates). Collision detection. Motion study is introduced.

Full-or-part-time: 32h

Practical classes: 12h

Self study : 20h

Space geometry and elemental metric

Description:

Elements of space geometry: point, straight line and planes. Relative positions among elements: belonging, intersection, parallelism and perpendicularity. Distances, angles and slopes. Particular positions with respect to projection planes.

Full-or-part-time: 20h

Practical classes: 8h

Self study : 12h

Applying elemental metric to creation and measurement of polyhedron bodies in 3D.

Description:

3D construction of a polyhedron from its metrical properties (angles, distances and slopes). Application of 3D CAD software's measurement systems and of space geometry concepts to analyse a polyhedron's metrical properties.

Full-or-part-time: 14h

Practical classes: 6h

Self study : 8h

Application of elemental metrics and surface theory to creation and measurement of bodies of revolution.

Description:

3D modelling of surfaces sets defined by their properties, metrical values, relative positions, intersections or unrolled. The application is limited to the study of sphere, toroid, revolution cylinder and revolution cone; with all the possible interactions.

Full-or-part-time: 24h

Practical classes: 10h

Guided activities: 14h

GRADING SYSTEM

The evaluation is divided into three qualifications:

- Partial Assessment (AP)
- Work (T)
- Final Exam (EF)

The Final Note (NF) will be:

$$NF = 0.2*AP + 0.3*T + 0.5*EF$$

Of the 30% of the Work grade, 15% corresponds to the same group grade and the other 15% is individual.

There is a Reevaluation exam (ER) . The mark of this reassessment exam has a weight of 70% in the Final Mark. The remaining 30% corresponds to the mark of the Work (T) carried out during the course.



BIBLIOGRAPHY

Basic:

- Fernández, J; Villa, M:A; Monguet, JM; López, B [et al.]. Exercicis Expressió Gràfica GETI ETSEIB 2021 22 [on line]. Barcelona: Universitat Politècnica de Catalunya, 2022 [Consultation: 15/06/2023]. Available on: <http://hdl.handle.net/2117/371943>.
- Villa, M. A.; Fernández, J.; Semeraro, A.; Solans, A. [et al.]. Exercicis Expressió Gràfica GETI ETSEIB 2020/21 [on line]. Barcelona: Universitat Politècnica de Catalunya, 2021 [Consultation: 15/06/2023]. Available on: <http://hdl.handle.net/2117/353492>.
- Fernandez, Joaquin; Ramos, Alba. Basic metric geometry [on line]. Barcelona: Universitat Politècnica de Catalunya, 2019 [Consultation: 15/06/2023]. Available on: <http://hdl.handle.net/2117/170536>.
- Fernández, J.; Ramos, A.; Villa, M. A.. Exercices, problems and practices of metric geometry [on line]. Barcelona: Universitat Politècnica de Catalunya, 2019 [Consultation: 15/06/2023]. Available on: <http://hdl.handle.net/2117/170529>.
- Fernández, J.. Sólidos de revolución: procedimiento para tangencias [on line]. Barcelona: Universitat Politècnica de Catalunya, 2019 [Consultation: 15/06/2023]. Available on: <http://hdl.handle.net/2117/170532>.
- García, I; Codina, F.X.; Castillo, M. Tècniques de representació gràfica : exercicis [on line]. Barcelona: Edicions UPC, 1999 [Consultation: 15/06/2023]. Available on: <https://upcommons.upc.edu/handle/2099.3/36398>. ISBN 8469918419.
- Monguet, J.M.; Trejo, A.. Innovació guiada pel disseny [on line]. 2a. Barcelona: Iniciativa Digital Politècnica, 2019 [Consultation: 15/06/2023]. Available on: <http://hdl.handle.net/2117/174464>. ISBN 9788498808193 .
- Félez, Jesús ; Martínez, M^a Luisa. Ingeniería gráfica y diseño. Madrid: Síntesis, 2008. ISBN 9788497564991.
- Bertoline, Gary R.. Technical graphics communication. 4a. Boston: McGraw-Hill, 2009. ISBN 9781853175275.
- Taibo Fernández, Ángel.. Geometría Descriptiva y sus aplicaciones. Tomos I y II.. 2a. Madrid: Tebar, 2010. ISBN 9788473603478..
- Asociación Española de Normalización y Certificación. Dibujo técnico: normas básicas. 2a. Madrid: AENOR, 2001. ISBN 8481432717.

RESOURCES

Hyperlink:

- <https://my.solidworks.com/account/student-access> (Consulta:15/06/2023).