

COURSE GUIDE

2025/26

Faculty

345 - Faculty of Engineering - Bilbao

Cycle

.

Degree

GITECI30 - Bachelor`s Degree in Industrial Technology Engineering

Year

First year

COURSE

27307 - Extended Engineering Graphics

Credits, ECTS: 6

COURSE DESCRIPTION

Compared to course #27306 engineering graphics classes, the lessons and lectures of this in-depth course constitute a step forward in the approach to engineering graphics.

The course provides a thorough knowledge of geometrical features (i.e. curves, surfaces, and volumes) with technical applications as well as a complete view of the different representation systems in technical drawing together with some geometric problems and different methods to solve them.

At the same time, this course provides the student with the standards affecting graphic representations in technical drawing.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

This subject fully qualifies the student for the creation of technical designs, particularly in the field of mechanical engineering, and for its communication (read-write processes) by means of a precise and universal graphic language.

It provides a full knowledge of the design process of an industrial product and the specific standardization of the technical drawing according to its application field. The student exercises his/her sketching ability with the classical drawing instruments (compass, square, and bevel) together with computer-aided design systems.

The main competences acquired by the student are the following:

- * Ability to design conceptualization and spatial visualization, fostering the creativity of the student for industrial design.
- * Ability to understand and make technical drawings of industrial assemblies knowing the graphic standardization of their elements and subassemblies (read-write).
- * Proficiency in the design of parts and industrial mechanisms from technical specifications, sometimes incomplete, and from functional conditions.
- * Notice of the meaning of the technical specifications in a drawing (forms and dimensions, geometric dimensioning and tolerancing, surface quality, etc.) and their impact on the feasibility of the manufacture of the designed product.
- * Ability to obtain and analyze the required information to propose and solve industrial design problems.
- * Proficiency in the application of graphic language in different technologies.

Theoretical and Practical Contents

The contents of the subject can be summarized in the following sections: technical specifications for design and manufacturing, standardization in industrial design, technical application of complex surfaces and curves, computer-aided design applications.

SHORT PROGRAM:

1. ANALYSIS OF FORM AND FUNCTION OF AN INDUSTRIAL ELEMENT. FORMAL CONDITIONS ACCORDING TO THE SPECIFICATIONS OF THE MANUFACTURING PROCESS.
2. DESIGN AND REPRESENTATION OF MECHANICAL JOINTS.
3. MANUFACTURING AND ASSEMBLY SPECIFICATIONS. APPLICATION OF GEOMETRIC DIMENSIONING AND TOLERANCING, SURFACE QUALITY, FITTINGS AND FUNCTIONAL DIMENSIONING.
4. DESIGN AND REPRESENTATION OF TOOLS AND MECHANISMS. MECHANISMS TO TRANSFORM MOVEMENT AND POWER TRANSMISSION MECHANISMS.
5. GRAPHIC REPRESENTATION IN DIFFERENT TECHNOLOGIES. CIVIL ENGINEERING DRAWINGS.
- 6 TECHNICAL SURFACES. APPLICATION TO CIVIL ENGINEERING
- 7 APPROACH, RESOLUTION AND REPRESENTATION OF INDUSTRIAL DESIGN PROBLEMS WITH GRAPHIC AND DESIGN COMPUTER-AIDED TOOLS.

TEACHING METHODS

Theoretical and practical classes, always maintaining the ratio between theory and practice.

Lectures: Theoretical expositions to teach basic concepts of the subject including the approach to problems and the discussion of possible solutions.

Practical Classes: Focused on problem solving, aiming at strengthening and deepening into conceptual foundations, putting a special emphasis on the use of auxiliary methods in the representation of technical drawings. Skill integration exercises are included.

Types of teaching

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	15		22,5	22,5					
Horas de Actividad No Presencial del Alumno/a	22,5		33,75	33,75					

Legend: M: Lecture-based S: Seminar GA: Applied classroom-based groups
GL: Applied laboratory-based groups GO: Applied computer-based groups GCL: Applied clinical-based groups
TA: Workshop TI: Industrial workshop GCA: Applied fieldwork groups

Evaluation methods

- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 100%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

There will be a final individual exam with traditional drawing tools. The performance of the student in the final examination will be a mark (F) in a range from 0 to 10 points.

A minimum of 5 points is generally required in the mark of the final exam to pass the subject.

During the four-month period, a practical assessment (P) will be carried out. It will consist of weekly practices, Lab classes, and partial controls. The performance of the student in the practical evaluation will be made in a qualification (P) in a range from 0 to 10 points.

The qualification (P) may be averaged with the score of the final examination (F), provided that in the latter a minimum rating is exceeded. The final examination (F) will have a minimum weight of 70% and the practical assessment (P) a maximum weight of 30%.

The practical assessment will not be compulsory and therefore it will not be necessary to request its withdrawal. This qualification (P) will only be taken into account if the final exam mark is improved.

Students not taking the final exam in the ordinary call will appear in the official records as "not attended".

In case health conditions prevent a teaching activity or face-to-face evaluation, non-presential options will be enabled and students will be informed immediately.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

There will be a final individual exam with traditional drawing tools. The performance of the student in the final examination will be a mark (F) in a range from 0 to 10 points.

A minimum of 5 points is generally required in the mark of the final exam to pass the subject.

The qualification (P) may be averaged with the score of the final examination (F), provided that in the latter a minimum rating is exceeded. The final examination (F) will have a minimum weight of 70% and the practical assessment (P) a maximum weight of 30%. This qualification (P) will only be taken into account if the final exam mark is improved.

Students not taking the final exam in the ordinary call will appear in the official records as "not attended".

In case health conditions prevent a teaching activity or face-to-face evaluation, non-presential options will be enabled and students will be informed immediately.

MANDATORY MATERIALS

BIBLIOGRAPHY

Basic bibliography

- * Dibujo Técnico. Sistemas de Representación < Zorrilla, E. y Muniozguren, J > Servicio de Publicaciones ETSI-Bilbao
- * Dibujo de Ingeniería < Zorrilla, E. y Muniozguren, J > Servicio de Publicaciones ETSI-Bilbao
- * Normalización Básica. Dibujo Técnico < Zorrilla, E. y Muniozguren, J > Servicio de Publicaciones ETSI-Bilbao
- * Ejercicios Prácticos de Gráficos de Ingeniería < varios autores > Servicio de Publicaciones ETSI-Bilbao
- * Ejercicios Prácticos de Ampliación de Gráficos de Ingeniería < varios autores > Servicio de Publicaciones ETSI-Bilbao
- * Manual de Normas UNE sobre Dibujo < AENOR >
- * Dibujo de Ingeniería Industrial < Urraza, G. y otros > ARTE KOPI S.L.
- * Dibujo Industrial < Félez, J. y Martínez, M.L. > Editorial Síntesis
- * Sistemas de Representación. Sistema Diédrico (Tomo I) <González García, V. y otros> Ediciones TEXGRAF
- * Diédrico Directo (Tomos I y II) < Giménez Peris, V. > Tip. Mazuelos S.L.
- * Fundamentos de Dibujo en Ingeniería <Luzadder, W.J.> PRENTICE-HALL
- * Dibujo y diseño en ingeniería <Jensen, C. et all> McGraw-Hill
- * Dibujo en Ingeniería y Comunicación Gráfica <Bertoline, G.R. et all> McGraw-Hill
- * cadcam < Barry Hawkes > Edit. Paraninfo

Detailed bibliography

- * Geometría Descriptiva. < Leighton Wellman, B. > Editorial Reverté S.A.
- * Geometría Constructiva Aplicada a la Técnica. < Hohemberg, F. > Editorial Labor, S.A.
- * Geometría Descriptiva Práctica. < Grant Hiran, E.> Ediciones del Castillo, S.A.
- * Geometría descriptiva superior y aplicada <Izquierdo Asensi, F.> Edit. Dossat, S.A.
- * Ejercicios de geometría descriptiva I (sistema diédrico) <Izquierdo Asensi, F.> ORYMU
- * Ejercicios de geometría descriptiva II (acotado y axonométrico) <Izquierdo Asensi, F.> ORYMU
- * Dibujo Técnico. < Bachmann, A. y Forberg, R. > Edit. Labor
- * Dibujo Industrial. < Chevalier, A. > Grupo Noriega Editores
- * Engineering Drawing and Graphic Technology < French, T.E. et all > McGraw-Hill
- * Engineering Graphics < F.E. Giesecke, F. E. et all > MacMillan Publishing Company
- * Fundamental of Interactive Computer Graphics. < Foley, J.D. and Van Dan, A. > Addison Wesley
- * Computational Geometry for Design ad Manufacture. < Faux, I.D. and Pratt, M.J. > Ellis Horwood
- * Geometric Modeling. < Mortenson, M.E. > John Wiley & Sons
- * Engineering Drawing & Design <Madsen, D.A. & Madsen D.P.> DELMAR
- * CAD/CAM Theory and Practice. < Ibrahim Zeid > McGraw-Hill

Journals

Web sites of interest

OBSERVATIONS