

COURSE GUIDE

2025/26

Faculty

345 - Faculty of Engineering - Bilbao

Cycle

.

Degree

GITECI30 - Bachelor`s Degree in Industrial Technology Engineering

Year

First year

COURSE

27306 - Graphics in Engineering

Credits, ECTS: 6

COURSE DESCRIPTION

This course provides 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 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 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 visualize geometrical features and industrial designs.
- \* Ability to use technical information, as a sender-receiver, in a precise and universal graphic language, this is, technical drawing, to communicate a great variety of design proposals in the different fields of engineering.
- \* Ability to analyze complex three-dimensional geometric shapes as a combination of basic geometric features.
- \* Ability to propose and solve geometrical problems in the industrial design field.
- \* Practice and expertise in the use of drawing instruments ('traditional' instruments and CAD systems) and in sketching within technical drawing.

Theoretical and Practical Contents

The contents of the subject can be summarized in the following sections: geometric foundations, curves and surfaces in industrial design, representation systems: dihedral, axonometric and topographic drawings, basic standards in technical drawing and introduction to computer-aided design.

SHORT PROGRAM:

1. SPACE AND GEOMETRIC FEATURES. PROPERTIES AND APPLICATION TO INDUSTRIAL DESIGN.
2. REPRESENTATION SYSTEMS: DIHEDRAL, AXONOMETRIC AND TOPOGRAPHICAL DRAWINGS: ALPHABET AND INVARIANTS. INTERRELATION. METHODS. INCIDENCE, METRICS AND POSITION ISSUES.
3. BASIC STANDARDIZATION. DIMENSIONING AND METROLOGY. TOLERANCES, SETTINGS AND SURFACE FINISHING.
4. BASIC MECHANICAL JOINTS.
5. INTRODUCTION TO COMPUTER-AIDED DESIGN SYSTEMS.

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		15	30					
Horas de Actividad No Presencial del Alumno/a	22,5		22,5	45					

**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

The final written exam (F) will be individual and will consist of the approach and graphic development of the solution to one or more design exercises in the field of industrial engineering. 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

The final written exam (F) will be individual and will consist of the approach and graphic development of the solution to one or more design exercises in the field of industrial engineering. 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**