



# Course guide

## 240731 - 240731 - Industrial Design

**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 TECHNOLOGIES AND ECONOMIC ANALYSIS (Syllabus 2018).  
(Compulsory subject).

**Academic year:** 2023    **ECTS Credits:** 6.0    **Languages:** English

### LECTURER

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**Coordinating lecturer:** Fernandez Sanchez, Joaquin

**Others:** Alsina Torrent, Jose Maria

### PRIOR SKILLS

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Those planned for the Degree

### REQUIREMENTS

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none

### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Transversal:**

04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.

05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.

06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

### TEACHING METHODOLOGY

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This subject is based on the Project Based Learning (PBL) methodology. From the first session to the last, the student must focus and develop graphic metric solutions for the design of real problems and practices.

The student must identify a real metric problem in his/her daily environment and must resolve it together with other students (collaborative or a cooperative team) looking for a real solution for a real need.

All the contents of the subject are intended to give the necessary background to resolve these real problems and practices.

The contents are structured as follows:

1. Files with the basic metric constructions. Each of them has a graphic description, a CAD solution file, and one or more videos.
2. Files with common metric constructions of Polyhedrons and Solids of Revolution.
3. Guide of exercises, problems and practices.
4. References
  - a. Polyhedron and Revolution Solids
  - b. Solidworks handbooks

## LEARNING OBJECTIVES OF THE SUBJECT

The main goal of the subject is:

Introduce the knowledge, techniques and behaviors who are present in a Graphic Process of an Industrial Design.

Particular objectives are:

1. Learn how to apply the metric conditions with a CAD Software.
2. Learn the essential constructive conditions of objects and groups of objects.
3. Learn how to identify and define a metric problem in a real environment.
4. Learn how to define a design under international regulations.
5. Learn how to develop a real industrial design in a collaborative or a cooperative team.

## STUDY LOAD

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

**Total learning time:** 150 h

## CONTENTS

### Basic Metric Geometry Constructions

#### Description:

In this chapter, the student works with the metric relationships between the point, the line and the plane.

#### Specific objectives:

1. Learn how to apply metric conditions with a CAD Software.
2. Learn the essential constructive conditions of objects and groups of objects

#### Related activities:

The self-study of the metric basic constructions explained in the Metric Basic Constructions handbook. This handbook offers a list of guidelines and video resources that facilitate a non-present learning of the necessary technics and knowledge procedures to resolve the most commons metric constructions of the Industrial Design.

#### Related competencies :

03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

#### Full-or-part-time: 32h

Theory classes: 4h

Practical classes: 8h

Self study : 20h



### Metric Relations and Graphic Constructions of Polyhedrons and Solids of Revolution

**Description:**

In this chapter, the student works applying the metric constructions to build simplified objects with Polyhedrons and Solids of Revolution.

**Specific objectives:**

1. Learn the essential constructive conditions of objects and groups of objects.
2. Learn how to identify and define a metric problem in a real environment.

**Related activities:**

This chapter is related with the self-study of:

1. The metric characteristics of the Polyhedrons and the Basic Solids of Revolution available in some selected papers and books.
2. The metric constructions for the tangency relationships between Solids of Revolution explained in the Solids of Revolution handbook.

**Related competencies :**

03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.

06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

**Full-or-part-time:** 40h

Theory classes: 4h

Practical classes: 16h

Self study : 20h

### Defining Industrial Designs with Graphical Tools

**Description:**

Defining Industrial Designs with Graphical Tools

**Specific objectives:**

1. Learn how to define a design following international regulations.
2. Learn how to develop a real graphic design in a cooperative team.

**Related activities:**

1. Resolve some practices based on a real Industrial Design using a CAD software.
2. Define the graphic documents under the International Regulations for an Industrial Technics Documents, such as UNE, ISO, DIN...
3. Resolve a real proposal of an Industrial Design by teams of four or more members.

**Related competencies :**

03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.

05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.

06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

**Full-or-part-time:** 78h

Theory classes: 8h

Practical classes: 20h

Self study : 50h

## GRADING SYSTEM

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1. Basic Metric Construction qualification (MC)
2. Metric of Polyhedrons and Solids of Revolution qualification (MPS)
3. Problem qualification (PR)
4. Problem Proposition (PP)
5. Design Practice (DP)

Continuous evaluation:  $MC*0.1+MPS*0.2+PR*0.2+PP*0.2+DP*0.3$

Final evaluation: DP and PP will not be evaluated in the final exam. In the other cases, the student could select which components of the continuous evaluation wants to recover.

## EXAMINATION RULES.

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The exams of the partial and final evaluations (MC, MPS and PR) must be carried out without the support of a calculator. For the rest of activities (PP and DP) students can have any kind of documentation.

## BIBLIOGRAPHY

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### Basic:

- Fernandez, J.; Ramos, A.; Villa, M. A. Exercices, problems and practices of metric geometry [on line]. Barcelona: Universitat Politècnica de Catalunya, 2019 [Consultation: 13/09/2022]. Available on: <https://upcommons.upc.edu/handle/2117/170529>.
- Normas UNE sobre dibujo técnico. 4a ed. Madrid: AENOR, 1997. ISBN 8481430528.
- Bertoline, Gary R. Technical graphics communication. 4th ed. Boston [etc.]: McGraw-Hill, cop. 2009. ISBN 9781853175275.
- Monguet, J. M.; Trejo, A. Innovació guiada pel disseny [on line]. 2a ed. Barcelona: Iniciativa Digital Politècnica, juny de 2018 [Consultation: 13/09/2022]. Available on: <https://upcommons.upc.edu/handle/2117/174464>. ISBN 9788498808186.
- Gasson, P. C. Geometry of spatial forms. Chichester : New York, N.Y: Ellis Horwood, 1983. ISBN 0853126208.
- Fernandez, Joaquin; Ramos, Alba. Basic metric geometry [on line]. 4a ed. Barcelona: ETSEIB, Departament d'Expressió Gràfica a l'Enginyeria, 2019 [Consultation: 29/10/2019]. Available on: <http://hdl.handle.net/2117/170536>.
- Fernandez, J.; Ramos, A. Solids of revolution, procedures for tangencies [on line]. 4a ed. Barcelona: Universitat Politècnica de Catalunya, 2019 [Consultation: 13/09/2022]. Available on: <https://upcommons.upc.edu/handle/2117/170537>.

## RESOURCES

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### Other resources:

- Solidworks Tutorials, Solidworks Learning Resources, Dassault Systems, 2019
  - Asociación Española de Normalización y Certificación Normas UNE. 4th Ed. Madrid: AENOR 1999.
- UNE