# Course guide
# 240501 - 240501 - Computer-Aided Design

**Last modified:** 08/04/2026

**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). (Optional subject).

**Academic year:** 2026 **ECTS Credits:** 3.0 **Languages:** Spanish

## LECTURER

**Coordinating lecturer:** Villa Sicilia, Arantza

**Others:** Villa Sicilia, Arantza

## DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

**Transversal:**
1. 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.
2. ENTREPRENEURSHIP AND INNOVATION: Knowing about and understanding how businesses are run and the sciences that govern their activity. Having the ability to understand labor laws and how planning, industrial and marketing strategies, quality and profits relate to each other.

## TEACHING METHODOLOGY

The Course needs to be attended to, and is above all practical, based on the learning and later implementation on to different application exercises.
These exercises will be realised on one computer per Student, with the support of a commercial C.A.D. program.
The lessons will take place in the IT class rooms, with capacity for 32 Students per class, 2 hours weekly.
The titles of the exercises to realise will be published at the start of the course, at the PRACTICAL CLASSES OF THE COURSE; in the web of the department, YIN ¿DEGE and at the Campus Digital ATENEA, to enable Students to prepare the exercises prior to attending to the lectures.
The Student will thus have one week of time after the corresponding lesson to send the files of the session, through the tasks created within the course in the Virtual Campus ATENEA, bearing in mind that on each task only one single file can be placed. If the size of the file is too large, it can be compressed (zip, rar).
Besides this, each Student must submit at the end of the course a PPT presentation, Flash or Web page, of all the practical exercises realised, in ATENEA, and there will be a due date for it.
The Student has the possibility to install the C.A.D. program in a legal and cost less way.

## LEARNING OBJECTIVES OF THE SUBJECT

GENERAL
Learn to use computer programs and tools destined for Electronic projects making up. The group of classes of the subject are directed to give the student the knowledge and techniques required for the communication through interactive graphics.
It is not just intended that the student learns to use mechanically one or more computer programmes but understands the models and its applications.
SPECIFIC
The objectives are fulfilled by the realization of some specific application exercises, according to the following classification and with the contents specified later on.
A. Consist in modelling individual objects in 3D (in the .sldprt format), of assorted difficultness in which the corresponding plan is provided, (in .pdf and .edwr format), and an image (.jpg) to help its display.
B. Carry out joint assemblies (in .sldasm format) from its components (which can be pieces previously created or provided in a .sldprt format), and make up animations with them (in the .avi format).
C. Objects to be modelled like the ones in A. but without leaving the detail plans, encouraging the capacity of innovation and creativity.
All exercises, as explained before, must be handed in the week after the corresponding class.
D. Do a final presentation, with a limit data of presentation, with images and videos, in a free format as mentioned before
All these exercises must be handed in in the Virtual Campus Atenea

## STUDY LOAD

| Type | Hours | Percentage |
|---|---|---|
| Practical classes | 30,0 | 40.00 |
| Self study | 45,0 | 60.00 |

**Total learning time:** 75 h

## CONTENTS

### 1.GENERAL APPROACH TO THREE DIMENSIONAL CAD PROGRAMS

**Description:**
Models, presentations and operation of CAD programs.
Application to training exercises.
Three dimensional work model.

**Full-or-part-time:** 4h
Theory classes: 1h
Practical classes: 1h
Self study : 2h

### 2.REALISATION OF COMPUTER INDUSTRIAL DESIGN

**Description:**
Representation, transformation and visualisation of objects in two and three dimensions.
Application of CAD techniques.
Environment and visualisation.
Sketching.
Design operations.

**Full-or-part-time:** 7h
Theory classes: 1h
Practical classes: 3h
Self study : 3h

### 3.THREE DIMENSIONAL TREATMENT OF TECHNICAL USE OBJECTS.

**Description:**
Working techniques in solids modelling.
Application to the design, representation, construction and treatment of objects of technical use in three dimensions.

**Full-or-part-time:** 11h
Theory classes: 1h
Practical classes: 4h
Self study : 6h

### 4.TECHNIQUES FOR SURFACES CONSTRUCTION.

**Description:**
Construction of surfaces.
Surfaces edit.
Types of curves and surfaces used in technical design.

**Full-or-part-time:** 11h
Theory classes: 1h
Practical classes: 4h
Self study : 6h

### 5.ASSEMBLIES.

**Description:**
Creation and treatment.
Relation of position.
Design operations.
Physical simulations.

**Full-or-part-time:** 17h
Theory classes: 1h
Practical classes: 1h
Self study : 15h

### 6.VISUAL REALISM.

**Description:**
Techniques of visual realism.
Application of light and colour.
Application to visualisation: illumination, appearance and texture of materials.

**Full-or-part-time:** 6h
Practical classes: 2h
Self study : 4h

### 7.MOVEMENT REPRESENTATION TECHNIQUES.

**Description:**
Animations.
Kinematic representation of moving bodies.
Inter activity.

**Full-or-part-time:** 8h
Theory classes: 1h
Practical classes: 2h
Self study : 5h

### 8.INTRODUCTION TO INDUSTRIAL APPLICATIONS.

**Description:**
Sheet metal.
Welding.
Basic simulation through finite elements.

**Full-or-part-time:** 9h
Theory classes: 1h
Practical classes: 4h
Self study : 4h

## GRADING SYSTEM

Any academic fraud, plagiarism or use or possession of unauthorised means in an assessment activity leads to a mark of zero (0) for the affected test or assignment. Furthermore, in accordance with the University's regulations, if disciplinary proceedings are initiated the subject is recorded as "Pending Assessment" until a decision is reached. These incidents are managed in accordance with the **Action Framework for Academic Integrity in Assessment at the UPC**.

Besides the files done in the corresponding class or sent the following week, each student must hand in by the end of the course a presentation of all the practices carried out, with a limit date which will be communicated by the beginning of the course. If any practice or final presentation is not strictly personal, the Ncurs will be 0.
The course mark will be obtained: Ncurs = 0,15* Nvp + 0;35* Npb + 0,50* Ntc
The final mark will be the highest one between Ncurs and (0,60* Nex final + 0,40* Ncurs).
Ncurs: Mark of the course
Nex final: Mark of the final exam
Nvp: Average mark of the attendance to all classes (attendance to all classes = 10)
Npb: Average mark of the files sent each of the classes
Ntc: Mark of the project of the final presentation
The passing mark will be a > or = 4, 95
The final exam will last 3h. and will consist in carrying out one or more exercises with the Solid Works program. The student will be able to check notes, manuals, and books¿ except any electronic device.

## BIBLIOGRAPHY

**Basic:**
- Bertoline, Gary R. Technical graphics communication. 4rd. Boston: McGraw-Hill, 2009. ISBN 9781853175275.
- Gómez González, Sergio. Solidworks : office professional [on line]. Barcelona: Marcombo, 2008 [Consultation: 04/09/2026]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=3175366. ISBN 9788426714589.
- Gómez González, Sergio. Solidworks práctico I : pieza, ensamblaje y dibujo. 2a ed. Barcelona: Marcombo, 2023. ISBN 9788426718013.
- Gómez González, Sergio. Solidworks simulation. Madrid: Ra-Ma, 2010. ISBN 9788499640068.
- Sanz Adán, Félix ; Blanco Fernández, Julio. CAD-CAM : gráficos, animación y simulación por computador. Madrid: International Thomson, 2002. ISBN 8497320778.
- Villoria San Miguel, Víctor. Curvas planas y dibujo por ordenador. Madrid: Dossat, DL 1992. ISBN 842370808X.
- Félez , Jesús ; Martínez, Ma. Luisa. Ingeniería gráfica y diseño. Madrid: Síntesis, 2008. ISBN 9788497564991.
- Asociación Española de Normalización y Certificación. Dibujo técnico. 4a ed. Madrid: AENOR, 2009. ISBN 9788481436266.
- Monguet, J. M.; Trejo, A. Innovació guiada pel disseny [on line]. 2a ed. Barcelona: Iniciativa Digital Politècnica, 2019 [Consultation: 07/09/2026]. Available on: https://upcommons.upc.edu/entities/publication/97045d59-485f-41a8-9a43-9835073e32d6. ISBN 9788498808186.

**Complementary:**
- Rodríguez de Abajo, Francisco Javier ; Roberto Galarraga. Normalización del dibujo industrial. San Sebastian: Donostiarra, 1993. ISBN 8470631810.
- Foley, James D. Introducción a la graficación por computador. Buenos Aires: Addison-Wesley Iberoamericana, 1996. ISBN 0201625997.
- Chevalier, A. Dibujo industrial. México: Limusa, 1992. ISBN 968183948X.
- Earle, James H. Graphics for Engineers : with Autocad. 6a ed. Upper Saddle River: Pearson Education, 2003. ISBN 0130081728.