Course guide
820015 - PE - Engineering Design

Last modified: 09/09/2026

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

Degree: BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2026 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: ALFONSO RODRIGUEZ DONO - JUAN CARLOS MARCILLO DELGADO

Others: Primer quadrimestre:
ALFONSO RODRIGUEZ DONO - Grups: M3, M31, M32, M33, M34
JUAN CARLOS MARCILLO DELGADO - Grups: M1, M11, M12, M13, T1, T11, T12
JAVIER RODRIGUEZ GALDEANO - Grups: M2, M21, M22, M23
ANDRES SUAREZ DEL CASTILLO - Grups: T2, T21, T22
FRANCISCO TOJA SILVA - Grups: M23, M34
ROBERT EMBODAS NOGUERA - Grups: M13, M33

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Understand the organisational structure and functions of project management offices.

Transversal:
2. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.
3. EFFECTIVE USE OF INFORMATI0N RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.
4. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
5. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

TEACHING METHODOLOGY

The course combines short lectures (10%), guided activities (20%), independent individual or group work (30%), and active learning methodologies (40%), including project-based learning, cooperative work, debate, and oral presentation and defence.

Teaching methodologies:
MD1. Participatory lectures covering theoretical and practical content.
MD2. Active learning methodologies in the classroom, including project-based learning, cooperative work, debate, and oral presentation and defence.
MD3. Practical classes involving the resolution, with student participation, of case studies and/or exercises related to the course content.
MD5. Student activities guided by the teaching staff.
MD8. Group work.
MD9. Independent work.

LEARNING OBJECTIVES OF THE SUBJECT

1. Using techniques and tools for managing engineering projects, including planning, development and implementation.
2. Knowing and applying specifications, regulations and standards.
3. Drafting texts with the appropriate structure to the communication objectives.
4. Introducing the text to an audience with the strategies and appropriate means.
5. Knowing and implementing the way and the dynamics of teamwork.
6. Identifying information needs and using collections, spaces and services available to design and implement suited searches to the topic.
7. Taking the work entrusted from the guidelines set by the teacher, deciding the time to be used in each section, including personal contributions and expanding the information sources indicated.
8. Taking initiatives that create opportunities with a vision of process implementation and market.
9. Applying sustainability criteria and professional codes of the profession.

STUDY LOAD

Type	Hours	Percentage
Guided activities	15,0	10.00
Hours large group	30,0	20.00
Hours small group	15,0	10.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

PMO. Project Management Office

Description:
Understanding the functioning of technical office and engineering companies.

Related competencies :
CEI-18. Understand the organisational structure and functions of project management offices.

Full-or-part-time: 12h
Theory classes: 6h
Self study : 6h

Sustainable Design and Circular Economy

Description:
Introduction to the integration of sustainability criteria into engineering projects, including environmental assessment, carbon footprint, ecological footprint, life cycle assessment, ecodesign, circular economy, and critical analysis of alternatives.

Related activities:
Carbon Footprint and Circular Economy - Debate

Related competencies :
CEI-18. Understand the organisational structure and functions of project management offices.
06 URI N1. EFFECTIVE USE OF INFORMATI0N RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.

Full-or-part-time: 12h
Theory classes: 6h
Self study : 6h

Product Design, Ergonomics and Protection of Results

Description:
Introduction to product design, from the identification of needs and the definition of specifications to conceptual and detailed design, incorporating design support tools, ergonomics, and basic concepts related to the protection of results.

Related competencies :
CEI-18. Understand the organisational structure and functions of project management offices.

Full-or-part-time: 12h
Theory classes: 6h
Self study : 6h

Project Development

Description:
Integrated application of the course content through the development of an engineering project. It includes problem definition, analysis of alternatives, preparation of the preliminary design, development of technical documentation, teamwork, project monitoring, presentation, and oral defence of the final project.

Related activities:
TEAM ENGINEERING PROJECT

Related competencies :
CEI-18. Understand the organisational structure and functions of project management offices.
04 COE N1. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
06 URI N1. EFFECTIVE USE OF INFORMATI0N RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.
05 TEQ N1. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.
07 AAT N1. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

Full-or-part-time: 90h
Practical classes: 15h
Guided activities: 15h
Self study : 60h

Project Management

Description:
To understand and apply the fundamentals of project management, including planning, scheduling, monitoring, control of time and resources, and methodologies applicable to the development of engineering projects.

Related competencies :
CEI-18. Understand the organisational structure and functions of project management offices.

Full-or-part-time: 12h
Theory classes: 6h
Self study : 6h

Viability

Description:
To assess the technical, economic, environmental, and social feasibility of the project, considering costs, budget, profitability, risks, and decision criteria for selecting among alternatives.

Related competencies :
CEI-18. Understand the organisational structure and functions of project management offices.

Full-or-part-time: 12h
Theory classes: 6h
Self study : 6h

ACTIVITIES

PARTICIPATORY CLASS/ LECTURE

Description:
Introductory, contextualisation and discussion sessions on the main course content, combining short presentations by the teaching staff with questions, examples and participatory activities.

Hours: 2h/week
In class (Big group): 1h
Self study: 1h

Delivery:
Exercises, activities or evidence of work, according to the course schedule.

Related competencies :
CEI-18. Understand the organisational structure and functions of project management offices.

Full-or-part-time: 30h
Theory classes: 15h
Self study: 15h

PROJECT-BASED LEARNING

Description:
Progressive development of an engineering project, or resolution of problems related to the project, through activities involving definition, planning, design, monitoring, documentation, presentation and oral defence.

Hours: 6h/week
Practical classes (half group): 1h
Guided study: 1h
Self study: 4h

Specific objectives:
Developing a PROJECT, Workgroups

Delivery:
PROJECT

Related competencies :
CEI-18. Understand the organisational structure and functions of project management offices.
06 URI N1. EFFECTIVE USE OF INFORMATI0N RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.
05 TEQ N1. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.
04 COE N1. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
07 AAT N1. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

Full-or-part-time: 90h
Practical classes: 15h
Guided activities: 15h
Self study: 60h

PRACTICE OF CASE STUDIES RESOLUTION AND EXERCISES

Description:
Guided activities involving the resolution of cases, exercises and problems related to the course content. They may be carried out individually or in groups and may include the application of tools, analysis of alternatives, discussion of results and technical argumentation.

Hours: 2h/week
In class (Big group): 1h
Self study: 1h

Delivery:
Exercises, problems, activities or evidence of work, according to the course schedule.

Related competencies :
CEI-18. Understand the organisational structure and functions of project management offices.
06 URI N1. EFFECTIVE USE OF INFORMATI0N RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.
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Full-or-part-time: 30h
Theory classes: 15h
Self study: 15h

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**.

(EV1, EV4) First individual assessment test: 20%
(EV1, EV4) Second individual assessment test: 20%
(EV3) Activities and deliverables: 30%
(EV2) Final project and oral defence: 30%

EV1. Written or oral tests to assess individual knowledge.
EV2. Assessment of practical work through reports, technical documentation, the final project, and oral defence.
EV3. Assessment of activities, deliverables, attendance, participation, and monitoring of the work carried out during the course.
EV4. Assessment of individual work.

The final grade includes the assessment of the transversal competencies developed in the course, particularly teamwork, oral and written communication, autonomous learning, proficient use of information resources, and sustainability and social commitment.

The assessment of teamwork may take into account the evaluation by the teaching staff and, where appropriate, by peers, of the contributions made by each student to the development of the project.

“Engineering Projects” does not include a reassessment examination.

Requirements
Submission of a project specifically developed as part of the course activities is a necessary condition for passing the course.

EXAMINATION RULES.

The individual assessment tests will be conducted in accordance with the conditions specified by the teaching staff responsible for the course.

BIBLIOGRAPHY

Complementary:

- Brusola Simon, Fernando. Oficina técnica y proyectos. Valencia: Universidad Politécnica de Valencia, 1999. ISBN 9788477217831.
- Santos Sabrás, Fernando. Ingeniería de proyectos. 2ª ed. Pamplona: Eunsa, 2002. ISBN 9788431317232.
- Companys Pascual, Ramón; Corominas Subías, Albert. Planificación y rentabilidad de proyectos industriales. Planificación y rentabilidad de proyectos industriales. Barcelona: Marcombo Boixerau Editores, 1988. ISBN 8426707173.
- Nicolás, Pere. Elaboración y control de presupuestos. Barcelona: Ediciones Gestión 2000, SA, 1999. ISBN 848088343X.
- Pahl, Gerhard ... [et al.]. Engineering design [on line]. 3rd ed. London: Springer London, 2007 [Consultation: 06/10/2016]. Available on: http://dx.doi.org/10.1007/978-1-84628-319-2. ISBN 9781846283192.
- Pugh, Stuart. Total design : integrated methods for successful product engineering. Wokingham, England [etc.]: Addison-Wesley Pub. Co., cop. 1990. ISBN 0201416395.
- Romero López, Carlos. Técnicas de programación y control de proyectos. Madrid: Piramide, 1997. ISBN 9788436811513.
- Stevenson, Susan; Whitmore, Steve. Strategies for engineering communication. New York [etc.]: John Wiley & Sons, cop. 2002. ISBN 0471128171.
- Zaïdi, A. QFD : despliegue de la función de calidad. Madrid: Díaz de Santos, 1993. ISBN 8479780606.
- A Guide to the project management body of knowledge (PMBOK® Guide) [on line]. 6th ed. Newtown Square, Pa.: Project Management Institute, 2017 [Consultation: 09/06/2020]. Available on: https://ebookcentral.proquest.com/lib/upcatalunya-ebooks/detail.action?docID=5180849. ISBN 9781628253900.
- ISO 14040:2006. Environmental management — Life cycle assessment.
- ISO 14067:2018. Greenhouse gases — Carbon footprint of products.
- ISO 14006:2020. Environmental management systems — Guidelines for incorporating ecodesign.
- European Commission. A new Circular Economy Action Plan: For a cleaner and more competitive Europe [on line]. [Consultation: 17/09/2026]. Available on: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0098.

RESOURCES

Hyperlink:

- ATENEA. http://atenea.upc.edu/moodle/

Other resources:

Learning material published in the virtual learning environment.