Course guide
2500028 - GECPROBPUB - Engineering Projects

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.
Degree: BACHELOR’S DEGREE IN CIVIL ENGINEERING (Syllabus 2020). (Compulsory subject).
Academic year: 2022  ECTS Credits: 6.0  Languages: Spanish, English

LECTURER

Coordinating lecturer: MARGARITA MARTÍNEZ DÍAZ
Others: ÁLVARO GAROLA CRESPO, CARLES LABRAÑA DE MIGUEL, MARGARITA MARTÍNEZ DÍAZ

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Generical:
14380. Scientific-technical training for the exercise of the profession of Technical Engineer of Public Works and knowledge of the functions of advice, analysis, design, calculation, project, construction, maintenance, conservation and exploitation.
14381. Understanding of the multiple technical and legal conditions that arise in the construction of a public work, and ability to use proven methods and accredited technologies, in order to achieve the highest efficiency in construction while respecting the environment and the protection of the health and safety of workers and users of public works.
14382. Knowledge, understanding and ability to apply the necessary legislation during the exercise of the profession of Technical Engineer of Public Works.
14383. Ability to project, inspect and direct works, in their field.
14388. Knowledge and ability to apply business management techniques and labor legislation.
14389. Knowledge of the history of civil engineering and training to analyze and assess public works in particular and construction in general.
14391. Conceive, project, manage and maintain systems in the field of construction engineering. Cover the entire life cycle of an infrastructure or system or service in the field of construction engineering. (Additional school competition).

TEACHING METHODOLOGY

The course consists of 2 hours per week of classroom activity (large size group) and 2 hours weekly with half the students (medium size group).

The 2 hours in the large size groups are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

The 2 hours in the medium size groups is devoted to solving practical problems with greater interaction with the students. The objective of these practical exercises is to consolidate the general and specific learning objectives.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and literature.
LEARNING OBJECTIVES OF THE SUBJECT

Knowledge about the methodology for carrying out an engineering project. Capacity to analyse safety and health problems in construction projects, and also to apply environmental impact analysis and assessment methodologies.

1. Ability to carry out the organization and planning of a work.
2. Ability to carry out a quality control plan for materials in a Civil Engineering project / work.

Knowledge of the documents that make up an engineering project. Knowledge of project elements such as environmental impact, economic studies, alternative studies. Knowledge of formal design and comprehensive project management. Knowledge of the different types of projects depending on the type of infrastructure (urbanization, road, hydraulic work, services, building, etc.). Legal Framework and regulations applicable to the drafting of a project. Technical conditionings. Collection of information and completion of previous studies. Economic approach. Profitability analysis. Approach and selection of alternatives. Multicriteria analysis. Works contract. The consulting and assistance contract. Project management. Legislation on public procurement. Quality and safety in the execution of the work. Integrated project management.

That the student acquires knowledge about the different phases of the engineering projects, of the aspects that must be taken into account in each one and of the methodologies used.

That the student acquires the ability to evaluate the impacts of an engineering project during all phases and from a holistic point of view (eg environmental, social, economic impact, etc.).

That the student knows basic aspects of engineering projects related to bidding, planning, management, safety and health, quality control or environmental impact.

At the end of the course the student will have acquired the ability to:

1. Carry out a study of alternatives, prior to adopting the solution to be designed
2. Know how to formally propose an engineering project
3. Know how to propose proposals for a tender
4. Make a comprehensive management analysis of a project
5. Make a cost / benefit and cost / efficiency analysis of a project

Knowledge of the documents that make up a project in engineering. Knowledge of project elements such as environmental impact, social impact, economic studies, alternative studies. Knowledge of formal design and comprehensive project management. Knowledge of the different types of projects Ability to plan, organize and manage projects. Incorporation of techniques for integrated project management, so that the entire useful life of the infrastructure is taken into account. Project financing. Profitability analysis. Risk analysis. Tender and works contract. Health and security. Quality control.

STUDY LOAD

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<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours medium group</td>
<td>30,0</td>
<td>20.00</td>
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<tr>
<td>Self study</td>
<td>84,0</td>
<td>56.00</td>
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<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.00</td>
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<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
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Total learning time: 150 h
CONTENTS

**Topic 0 - Introductory session to the subject**

**Description:**
Presentation of the subject: objectives, teaching methodology, evaluation methodology, syllabus.

Presentation of the project that will serve as a guide for the different topics and activities.

**Specific objectives:**
To make known to the student the organization and the contents of the subject.

Motivate the student by linking the subject to a real and meaningful project.

**Full-or-part-time:** 4h 48m
Theory classes: 2h
Self study: 2h 48m

**Topic 1 - Introduction to projects: types and key aspects**

**Description:**
Description of the different types of projects in which a civil engineer can participate.

Key aspects of any project: safety and health, environmental impact and quality control. Regulations and methodologies.

**Group activity - Key aspects of engineering projects**

Key aspects of any project: safety and health, environmental impact and quality control. Regulations and methodologies.

**Full-or-part-time:** 9h 36m
Theory classes: 2h
Practical classes: 2h
Self study: 5h 36m

**Topic 2 - Documents to be prepared during the design process**

**Description:**
Phases of the engineering project and regulatory documents to be developed in each
Exercises

**Group activity - Analysis of documents integrated in the project process**

**Specific objectives:**
Learning the steps to take before, during and after the implementation of an engineering project. Ability to distinguish and prepare the necessary documents in each case.

**Full-or-part-time:** 12h
Theory classes: 2h
Practical classes: 3h
Self study: 7h
Item 3 - Study of alternatives using multicriteria analysis methods.

Description:
Exercises
Group activity - Analysis of alternatives by multicriteria methods

Specific objectives:
Learn the importance of multicriteria analysis and the objective choice of an alternative in an engineering project. Learning specific methodologies.

Full-or-part-time: 21h 36m
Theory classes: 4h
Practical classes: 5h
Self study: 12h 36m

Item 4 - Analysis of project profitability

Description:
Principles and objectives of project profitability analysis. Indices and methodologies used: differences Fundamentals, indices and methodology for the elaboration of the cost-benefit analysis of an engineering project
Exercises
Group activity - Profitability analysis

Specific objectives:
That the student knows how to assess the degree of profitability of an engineering project Learn the usefulness of cost-benefit analysis and limits. Learn how to make this analysis.

Full-or-part-time: 24h
Theory classes: 4h
Practical classes: 6h
Self study: 14h

Item 5 - Comprehensive project management

Description:
Concept of comprehensive management. Objectives, agents and classical methodologies. Current techniques for comprehensive project management. New business philosophy. Management support tools
Exercises
Group activity - Project management

Specific objectives:
Learn to manage a project efficiently and in an integrated way Know and be able to use the newest techniques for project management

Full-or-part-time: 12h
Theory classes: 2h
Practical classes: 3h
Self study: 7h
<table>
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<tr>
<th>Item 6 - Project financing</th>
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<tbody>
<tr>
<td><strong>Description:</strong> Basic concepts. Modalities and cases. Exercises Group activity - Project financing</td>
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<tr>
<td><strong>Specific objectives:</strong> Learning about the different modalities of financing an engineering project and its adaptation according to the case.</td>
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<tr>
<td><strong>Full-or-part-time:</strong> 12h Theory classes: 2h Practical classes: 3h Self study: 7h</td>
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<th>Item 7 - The risk in engineering projects.</th>
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<td><strong>Description:</strong> Risk concepts. Indices and methodologies for measuring it. Strategies Exercises Group activity - The risk in engineering projects</td>
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<td><strong>Specific objectives:</strong> Identification of the risk associated with an engineering project. Ability to assess it</td>
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<td><strong>Full-or-part-time:</strong> 12h Theory classes: 2h Practical classes: 3h Self study: 7h</td>
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<th>Item 8 - The bidding process</th>
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<td><strong>Description:</strong> Agents involved in the bidding process. Regulations in the case of Public Works. Documentation. Strategy Exercises Group activity - Bidding for projects</td>
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<td><strong>Specific objectives:</strong> Learn how to prepare a tender proposal for an engineering project</td>
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<td><strong>Full-or-part-time:</strong> 14h 23m Theory classes: 1h Practical classes: 5h Self study: 8h 23m</td>
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Item 9 - Innovation and entrepreneurship

Description:
Group activity - Innovation and entrepreneurship

Specific objectives:
Bringing the student closer to the world of engineering entrepreneurship

Full-or-part-time: 9h 36m
Theory classes: 2h
Practical classes: 2h
Self study : 5h 36m

Evaluation tests

Full-or-part-time: 12h
Laboratory classes: 5h
Self study : 7h

GRADING SYSTEM
The mark of the course is obtained from the ratings of continuous assessment and their corresponding laboratories and/or classroom computers.

Continuous assessment consist in several activities, both individually and in group, of additive and training characteristics, carried out during the year (both in and out of the classroom).

The teachings of the laboratory grade is the average in such activities.

The evaluation tests consist of a part with questions about concepts associated with the learning objectives of the course with regard to knowledge or understanding, and a part with a set of application exercises.

EXAMINATION RULES.
Students who have not made the corresponding deliveries of each proposed internship will not be able to take the assessment test.

Students who fail the ordinary assessment who have regularly taken the assessment tests of the suspended subject will have the option of taking a re-assessment test in the period set in the academic calendar. Students who have already passed it or students who have qualified as not presented will not be able to take the re-assessment test for a subject. Neither do students who have not made the corresponding deliveries of each proposed internship. The maximum grade in the case of taking the re-assessment exam will be five (5.0). The non-attendance of a student summoned to the re-evaluation test, held in the set period may not lead to the performance of another test with a later date. Extraordinary assessments will be carried out for those students who, due to accredited force majeure, have not been able to take any of the continuous assessment tests. These tests must be authorized by the corresponding head of studies, at the request of the teacher responsible for the subject, and will be carried out within the corresponding teaching period.

If a student copies the assessment test or the re-assessment test, he / she will fail the subject without the possibility of recovery. The head of studies will also be informed
BIBLIOGRAPHY

Basic: