Course guides
2500028 - GECPROBPUB - Public Works Project

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: 2021 ECTS Credits: 6.0 Languages: Catalan, Spanish

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.

- The public works project: classical vision and current vision. Phases of the project process. Types of projects.
- Documents required during the project process. Regulations to be applied. Elaboration.
- Aspects prior to the writing of a project: study of alternatives through multi-criteria analysis. Analysis of rentability.
- Fundamental aspects of the project: health and safety, environmental impact and quality. Applicable regulations.
- The bidding process. Applicable regulations. Types of tender. Preparation of the offer. The award process.
- Comprehensive project management: agents involved, project life cycle, control and monitoring. Advanced management tools and models: building information modeling, lean management, etc. Business strategy.
- Projects with a vocation for innovation and entrepreneurship

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hours medium group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Self study</td>
<td>84,0</td>
<td>56.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

Introduction to the public works project

Description:
Project definition and phases of the project project according to the traditional vision and the current vision. Define the different types of project and the agents involved, with their responsibilities

Full-or-part-time: 9h 36m
Theory classes: 4h
Self study : 5h 36m
Documents to be prepared during the project process

Description:
Memòria, annexes, plans, specifications and budgets. Format and content in the planning phase, in the preliminary studies, in the preliminary projects and in the projects.

Building Information Modeling as a documentation automation and control tool

Full-or-part-time: 19h 12m
Theory classes: 4h
Practical classes: 4h
Self study : 11h 12m

Project evaluation

Description:
Multi-criteria definition. Selection of criteria and weights to apply. Most used multi-criteria methodologies. Sensitivity and robustness analysis.

Full-or-part-time: 9h 36m
Theory classes: 4h
Self study : 5h 36m

Project evaluation

Description:
Case analysis using multicriteria tools.
Profitability analysis of an alternative. Static criteria versus dynamic criteria.
Case profitability case analysis.

Full-or-part-time: 28h 47m
Theory classes: 4h
Practical classes: 8h
Self study : 16h 47m

Three Fundamental aspects of the projects

Description:
Application regulations. Proactive and reactive security. Agents involved.
Application regulations. Sustainability in projects. Obligations, trends, social impact.
Quality control and monitoring in all phases of the design process. Applicable regulations. Tools and agents.

Full-or-part-time: 9h 36m
Theory classes: 4h
Self study : 5h 36m
The bidding process

Description:
Case analysis on the bidding process. Activities aimed at working in class.

Full-or-part-time: 19h 12m
Theory classes: 4h
Practical classes: 4h
Self study: 11h 12m

Integral project management

Description:
Philosophy. Definition of the objectives pursued. Business strategy. Conjunctural and risk analysis. Leadership versus teamwork. Definition of stages and strategies. Determination of project activities. (Work breakdown structure). Assignment of Responsibilities (Assignment of Responsibility Matrix) Assignment of resources and scheduling of tasks (Gantt charts and network diagrams) Measures to correct deviations or to modify the entire project. Closing stage: Completion and delivery of project results (deliverables) Evaluation and learning stage to improve the management of future projects. Applied explanation of comprehensive project management tools. Practical application of comprehensive project management tools to specific cases, in the form of directed activities. Tools such as BIM, Lean, Canvas or Agile are proposed.

Full-or-part-time: 28h 47m
Theory classes: 6h
Practical classes: 6h
Self study: 16h 47m

Innovation and entrepreneurship in public works projects

Description:
Guided activities related to analyzing cases applied in the field of innovation and entrepreneurship.

Full-or-part-time: 9h 36m
Practical classes: 4h
Self study: 5h 36m

Evaluation activities

Full-or-part-time: 9h 36m
Laboratory classes: 4h
Self study: 5h 36m
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.

If any of the laboratory or continuous assessment activities are not performed in the scheduled period, it will be considered a zero score.

BIBLIOGRAPHY

Basic: