Construction Procedures and Electrotechnics (250228)

General Information

School	ETSECCPB
Departments	Departament d'Enginyeria Civil i Ambiental (DECA) Departament d'Enginyeria Elèctrica (DEE)
Credits	6.0 ECTS
Programs	GRAU EN ENGINYERIA D'OBRES PÚBLIQUES (pla 2010)
Course	2022/23

Main teaching language at each group

- Group 10Q2 Spanish (Q2)

Faculty

Responsible Faculty: Gonzalo Ramos Schneider
Faculty: Magí Domingo Tarancón, Samuel Galceran Arellano, Gonzalo Ramos Schneider, Joan Rull Duran, Nikola Tosic

Objectives of Education

Students will learn about construction procedures and machinery. They will also acquire a basic understanding of the electrical power system: the generation of energy, the transmission network, energy distribution, the different types of power lines and conductors, and the laws regulating high and low voltage.

Upon completion of the course, students will have acquired the ability to: 1. Organise and plan a construction project. 2. Draw up a quality-control plan for the materials used in a construction engineering project. 3. Analyse the electric power transmission and distribution system and design an electrical installation.

Historical development of civil engineering and construction techniques applied in public works; The most common construction operations and the resources and machinery used in each case (earthworks, piles, shear walls, concrete and bituminous mixtures); Electric power transmission and distribution system; Criteria for designing and calculating electrical installations and consumption

Competencies

Especific

Fundamental knowledge of the electrical power system: energy generation and the transport and distribution network, and the types of lines and conductors. Knowledge of the low and high voltage regulations
Ability to apply environmental impact study and assessment methodologies.
Knowledge of construction procedures, construction machinery and the techniques for organising, measuring and valuing works.
Ability to analyse health and safety issues in construction works
Ability to use the appropriate construction procedures, construction machinery and planning techniques in carrying out works
Knowledge and understanding of the functioning of ecosystems and environmental factors

Transversal

ENTREPRENEURSHIP AND INNOVATION - Level 3. Using knowledge and strategic skills to set up and manage projects. Applying systemic solutions to complex problems. Devising and managing innovation in organizations.
SUSTAINABILITY AND SOCIAL COMMITMENT - Level 3. Taking social, economic and environmental factors into account in the application of solutions. Undertaking projects that tie in with human development and sustainability.
EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.
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.

Generic

Students will learn to identify, formulate and solve a range of engineering problems. They will be expected to show initiative in interpreting and solving specific civil engineering problems and to demonstrate creativity and decision-making skills. Finally, students will develop creative and systematic strategies for analysing and solving problems.
Students will learn to identify and model complex systems and to identify the most suitable methods and tools for defining and solving the associated equations. They will acquire the knowledge and skills to perform qualitative analyses and approximations, estimate the uncertainty of results, formulate hypotheses and define experimental methods through which to validate them, establish compromises, identify principal components and prioritise their work. More generally, students will develop their capacity for critical thought.
Students will learn to plan, design, manage and maintain systems suitable for use in civil engineering. They will develop a systematic approach to the complete life-cycle of a civil engineering infrastructure, system or service, which includes drafting and finalising project plans, identifying the basic materials and technologies required, making decisions, managing the different project activities, performing measurements, calculations and assessments, ensuring compliance with specifications, regulations and compulsory standards, evaluating the social and environmental impact of the processes and techniques used, and conducting economic analyses of human and material resources.
Students will learn to identify market requirements and opportunities and to compile information from which to determine the ideal specifications of a new product, process or service. They will acquire the skills to prepare a basic business plan, define a new product, process or service, and plan and implement the different phases in the design process.

Total hours of student work

		Hours	Percentage
Supervised Learning	Large group	30.0 h	45.45 %
	Medium group	15.0 h	22.73 %
	Laboratory classes	15.0 h	22.73 %
	Guided Activities	6.0 h	9.09 %
Self Study		84.0 h	

Contents

Electrical engineering

Introduction to electric power system
Single-phase circuits
Three-phase circuits
Transformers
Facilities
Practices

Construction Procedures

Structures Construction
Construction of underground works
Construction of Hydraulic Infrastructures
Practical cases

Activities

Virtual visit to works

Dedication

6h

Teaching Methodology

The subject consists of 4 hours a week of face-to-face classes.

The electrical engineering classes of groups 10Q2A and 10Q2B will be taught in Catalan, those of procedures in Spanish.

The language indicated in the subject is Spanish because it is the majority.

In some theoretical classes the teachers explain the basic concepts and materials of the subject, present examples and do exercises. Hours are spent solving problems with greater interaction with students.

Practical exercises are carried out in order to consolidate the general and specific learning objectives.

Support material is used in the format of a detailed teaching plan through the ATENEA virtual campus: contents, programming of assessment and directed learning activities and bibliography.

The course includes workshops and presentations by speakers other than the professors of the course. These may be held in Spanish or Catalan and, exceptionally, in English.

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be held in other languages.

Grading Rules

(*) The evaluation calendar and grading rules will be approved before the start of the course.

Assessment tests consist of a part with questions about concepts associated with the learning objectives of the subject in terms of knowledge or comprehension, and a set of application exercises.

Two assessments are made, the first in the Electrical Engineering part (E1), which corresponds to 33% of the mark and the second in the Procedures part (E2), which corresponds to 67% of the mark. Therefore, the grade will be 0.33 E1 + 0.67 E2. In both evaluations there will be a theoretical part and practical exercises.

Criteria of qualification and of admission to the re-evaluation: The students suspended to the ordinary evaluation that have presented regularly in the proofs of evaluation of the asignatura suspended will have option to realize a proof of re-evaluation in the period fixed 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. 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.

Test Rules

Failure to perform a laboratory or continuous assessment activity in the scheduled period will result in a mark of zero in that activity.

Office Hours

It will be on demand of the students

Bibliography

Basic

- Barrero, F. Sistemas de energía eléctrica. Madrid: Thomson, 2004. ISBN 8479322835.
- Gómez Expósito, A. Análisis y operación de sistemas de energía eléctrica. Madrid: McGrawHill Interamericana, 2002. ISBN 844813592X.
- Ras, E. Teoría de circuitos: fundamentos. 4ª ed. renov. Barcelona : México D.F.: Marcombo Boixareu, 1987. ISBN 8426706738.
- Ras, E. Transformadores de potencia, de medida y de protección. 7a ed. renov. Barcelona: Marcombo, 1988. ISBN 8426706908.
- Ley 30/2007 de Contratos con el Sector Público. Barcelona: Escola d'Administració Pública de Catalunya, 2007. ISBN 9788439376347.
- Cañizal, F. La redacción del proyecto: aspectos previos y metodología. Santander: Universidad de Cantabria, 1998. ISBN 8489627436.
- Morilla, I. Guía metodológica y práctica para la realización de proyectos. 3a ed. Madrid: Colegio de Ingenieros de Caminos, Canales y Puertos, 2001. ISBN 8438001955 (O.C.).

Complementary

- Wildi, T. Tecnología de los sistemas eléctricos de potencia. Hispano Europea, 1983. ISBN 8425506646.
- Weedy, B.M. Electric power systems. 5th. John Wiley & Sons, 2012. ISBN 9781118361092.