Universidad Zaragoza

Year : 2019/20

28710 - Electrotechnics

Syllabus Information

Academic Year: 2019/20
Subject: 28710 - Electrotechnics
Faculty / School: 175 -

Degree: 423 - Bachelor's Degree in Civil Engineering

ECTS: 6.0
Year: 2
Semester: Second semester
Subject Type: Basic Education
Module:

1.General information

1.1.Aims of the course

The subject and its results respond to the following approaches and objectives:

- Establish an overview of the generation, transport, distribution and consumption of electricity.
- Show the basic concepts of the theory of electrical circuits and the study of the different kind of circuits, based on the analysis of networks, according to the nature of the power supply. Direct Current and Alternating Current in single and three-phase are studied as energy sources.
- Introduce fundamental concepts about the electric power system, classification of networks, as well as types of lines and conductors. The section of the conductors of the electric lines and assess their importance from a technical point of view and without losing sight of economic aspects.
- Show the existing regulations on low and high voltage.

1.2.Context and importance of this course in the degree

The subject of Electrotechnics, is part of the degree in Civil Engineering taught by EUPLA, framed within the group of subjects that make up the module called Basic Training and within this to the physical subject. It is a subject of the second course located in the third semester and of basic training (BT), with a teaching load of 6 ECTS credits.

This subject implies a very important impact in the acquisition of the skills of the degree, as well as providing additional useful training in the performance of the functions of the Civil Engineer related to the field of electricity field.

The need of the subject within the curriculum of the present degree is more than justified and it is understood that the ideal would be that, as a student, this subject will be started with clear concepts about what an electric circuit is, what components it has, as well as like the physics that lies behind it, that is, the theory of electric and magnetic fields, previous knowledge acquired in previous studies.

1.3.Recommendations to take this course

The development of the subject Electrotechnics requires putting into play knowledge and strategies from subjects related to:

- **Technical drawing:** Graphic resources, expression techniques and the use of standard lines are an essential tool to express technical ideas. The views, the perspective images, the plans and the circuit diagrams are documents commonly used in Electrotechnics.
- **Physics:** Knowledge of the laws and regulatory principles of physical phenomena allows understanding the operation of the devices and systems that are the object of study in Electrical Engineering.
- **Chemmistry:** The internal structure of matter and the study of chemical phenomena are basic in the study of Electrical Engineering
- **Mathematics:** The mathematical tools to perform the necessary calculations in Electrotechnics are provided in this subject.

In relation to the above, in the first course and in advance subjects related to these subjects are studied, providing the basic knowledge to be able to follow without any kind of problem the evolution of the subject in question.

This subject does not possess any normative prerequisite nor does it require specific complementary knowledge. Although it is necessary to be clear that an adequate training base is needed in the disciplines previously indicated.

2.Learning goals

2.1.Competences

As generic and specific competences the student will acquire:

- C10: Fundamental knowledge about the electric power system: power generation, transport network, distribution and distribution, as well as types of lines and conductors. Knowledge of the regulations on low and high voltage.
- G01: Capacity for organization and planning.
- G02: Ability to solve problems.
- G03: Ability to make decisions.
- G04: Aptitude for oral and written communication of the native language.
- G05: Capacity for analysis and synthesis.
- G06: Information management capacity.
- G07: Ability to work as a team.
- G08: Capacity for critical reasoning.
- G09: Ability to work in an interdisciplinary team.
- G10: Ability to work in an international context.
- G11: Capacity for improvisation and adaptation to face new situations.
- G12: Leadership aptitude.
- G13: Positive social attitude in the face of social and technological innovations.
- G14: Capacity for reasoning, discussion and exposition of ideas.
- G15: Ability to communicate through the word and the image.
- G16: Ability to search, analyze and select information.
- G17: Capacity for autonomous learning.
- G23: Understand and understand respect for fundamental rights, equal opportunities for women and men, universal accessibility for people with disabilities, and respect for the values of the culture of peace and democratic values.
- G24: Encourage entrepreneurship.
- G25: Knowledge of information and communication technologies.

2.2.Learning goals

At the end of this subject, the student will have applied knowledge of the principles of general mechanics, system statics structural, the geometry of masses, the behaviors and methods of analysis of the elastic behavior of the soil. Likewise, it will have the capacity to analyze and know the spatial geometry of bodies. Acquire the fundamentals of electrical engineering and its application in Civil Engineering.

2.3.Importance of learning goals

This subject has a marked engineering character, that is, it offers training with application contents and immediate development in the labor and professional market. Through the achievement of the relevant learning results, the necessary capacity is obtained for the understanding of the operation of circuits and power lines, which will be absolutely essential for the design and implementation of any application, plant, process, etc. included within the scope of Civil Engineering.

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The learning process designed for this subject is based on the following:

Strong interaction between the teacher/student. This interaction is brought into being through a division of work and responsibilities between the students and the teacher. Nevertheless, it must be taken into account that, to a certain degree, students can set their learning pace based on their own needs and availability, following the guidelines set by the teacher.

The current subject Electrotechnics is conceived as a stand-alone combination of contents, yet organized into three fundamental and complementary forms, which are: the theoretical concepts of each teaching unit, the solving of problems or resolution of questions and laboratory work, at the same time supported by other activities.

The organization of teaching will be carried out using the following steps:

- **Theory Classes:** Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them in topics and or sections, interrelating them.
- **Practical Classes:** The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.
- **Laboratory Workshop:** The lecture group is divided up into various groups, according to the number of registered students, in order to make up smaller sized groups.
- **Group Tutorials:** Programmed activities of learning follow-up in which the teacher meets with a group of students to guide their work of autonomous learning and supervision of works directed or requiring a very high degree of advice by the teacher.
- **Individual Tutorials:** Those carried out giving individual, personalized attention with a teacher from the department. Said tutorials may be in person or online.

4.2.Learning tasks

The programme offered to the student to help them achieve their target results is made up of the following activities...

Involves the active participation of the student, in a way that the results achieved in the learning process are developed, not taking away from those already set out, the activities are the following:

Face-to-face generic activities:

- Theory Classes: The theoretical concepts of the subject are explained and illustrative examples are developed as support to the theory when necessary.
- Practical Classes: Problems and practical cases are carried out, complementary to the theoretical concepts studied.
- Laboratory Workshop: This work is tutored by a teacher, in groups of students.

Generic non-class activities:

- Study and understanding of the theory taught in the lectures.
- Understanding and assimilation of the problems and practical cases solved in the practical classes.
- Preparation of seminars, solutions to proposed problems, etc.
- Preparation of laboratory workshops, preparation of summaries and reports.
- Preparation of the written tests for continuous assessment and final exams.

Tutored autonomous activities:

Although they will have more of a face character have been taken into account in part for their idiosyncrasies, they will be primarily focused on seminars and tutorials under the supervision of the teacher.

Reinforcement activities:

Non-contact marking character, through a virtual learning portal (Moodle) various activities that reinforce the basic contents of the subject be addressed. These activities can be customized or not, controlling their realization through it.

4.3.Syllabus

The subject is structured around two complementary components contents:

- Theorists.
- Practical.

THEORETICAL CONTENTS.

The theoretical contents are articulated based on eight teaching units attached relationship, indivisible blocks of treatment, given the configuration of the subject that program. These topics collect the contents needed for the acquisition of predetermined learning outcomes.

- **TOPIC 1:** Generation, transformation and distribution of electric power.
- **TOPIC 2:** Basic electrical concepts.
- **TOPIC 3:** Direct current.
- **TOPIC 4:** Single phase sinusoidal alternating current.

- **TOPIC 5:** Three phase sinusoidal alternating current.
- **TOPIC 6:** Direct current lines.
- **TOPIC 7:** Single phase alternating current lines.
- **TOPIC 8:** Three phase alternating current lines.

PRACTICAL CONTENTS.

Those workshop to be developed in the laboratory, which will be performed by students in sessions of one hour below.

- **WORKSHOP 1:** Simulator of electrical circuits / Introduction to laboratory instrumentation.
- **WORKSHOP 2:** Circuits in DC.
- **WORKSHOP 3:** Circuits in AC.
- **WORKSHOP 4:** Power measurement in three-phase systems.

4.4.Course planning and calendar

The subject has 6 ECTS credits, which represents 150 hours of student work in the subject during the trimester, in other words, 10 hours per week for 15 weeks of class.

The orientative time distribution of a teaching week is as follows:

- 45 hours of lectures, with 50% theoretical demonstration and 50% solving type problems.
- 10 hours of laboratory workshop, in 1 or 2 hour sessions.
- 5 hours of written assessment tests, one or two hour per test.
- 90 hours of personal study, divided up over the 15 weeks of the semester.

Written continuous assessment tests are related to the following topics:

- **Written assessment test 1:** Topic 2 and 3.
- **Written assessment test 2:** Topics 4 and 5.
- **Written assessment test 3:** Topics 6, 7 and 8.

The most significant dates of the continuous evaluation system will be published in moodle during the development of the course.

The dates of the global evaluation test will be published officially in:

http://www.eupla.unizar.es/index.php/secretaria-2/informacion-academica/distribucion-de-exam

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=28710&year=2019