

28710 - Electrotechnics

Syllabus Information

Academic Year: 2020/21

Subject: 28710 - Electrotechnics

Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia

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 fourth 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, Physics, Chemistry and Mathematics.

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

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)

To pass the course, the student must demonstrate that he has achieved the expected learning results through one of the following procedures:

CONTINUOUS ASSESSMENT

In order for students to be eligible, students must attend at least 80% of the face-to-face classes (master classes, practicals, technical visits, etc.)

Following the spirit of Bologna, regarding the degree of involvement and continued work of the student throughout the course, the evaluation of the subject contemplates the continuous assessment system, as the most consistent to be in line with the guidelines set by the new framework of the EEES.

The continuous assessment system will have the following group of qualifying activities:

Exercises, theoretical questions and individual activities in class: Active participation in the entire teaching-learning process, solving theoretical and practical exercises indicated by the teacher both in class and outside, it will contribute up to 10% to the final grade for the subject.

Laboratory practices: Practices corresponding to each of the subject blocks susceptible of it, will be carried out. These will serve to assimilate and apply the concepts seen in theory.

These practices will be carried out individually or in groups, depending on the difficulty of the practice. Each student individually must make a practice report in which the calculations and analyzes prior to carrying it out must be contained, comparing this analysis with the measurements made in the laboratory and showing correct operation. In addition, you must include the methodology followed during the practice. This report must be submitted for correction before the next class.

The delivery of the previous analysis, the assessment of the dynamics followed for the correct execution and operation, together with the memories of the practices, if they are delivered correctly, completely and within the required time period, will contribute 15% to the final grade of the subject.

The completion of the practices is mandatory to be eligible for the continuous assessment system, as well as achieving a minimum grade of 30% in each of them to average.

If any student cannot attend the practical classes in a justified way or will not reach the minimum to average in one of the practices, an extraordinary session will be enabled so that the unsuccessful practice can be completed to pass the subject.

Proposed works: The teacher will propose different works to be carried out individually or in groups. They will be compulsory, both the memory of the works and the public exhibition / defense of them will be evaluated. The note corresponding to the defense and the memory will be the arithmetic mean of both parties. This activity will contribute up to

20% to the final grade for the course, to take this grade into account, the works must be delivered on the dates set, if they are not delivered on time and form, they will be evaluated with a 0.

Written tests: They will be carried out to regulate the distribution of effort over time. Said tests will include theoretical and / or practical questions of the different subjects to be evaluated, the number of tests will be between two and / or three throughout the semester. This activity will contribute 55% to the final grade for the course.

The following table serves as a summary of the above:

Activities of the continuous assessment system	Weighting
Exercises, theoretical questions and individual activities in class	10%
Laboratory practices	15%
Proposed works	20%
Written tests	55%

Prior to the first official call, the teacher will notify each student whether or not they have passed the subject based on the use of the continuous assessment system, based on the sum of the scores obtained in the different activities, each contributing a minimum of 30%. In case of not passing in this way, the student will have two additional calls to do so (global assessment test), on the other hand, the student who has passed the course through this dynamic, may also choose the global assessment test, on first call, to upload a note but never to download.

The evaluation criteria to be followed for the activities of the continuous evaluation system are:

Exercises, theoretical questions and individual activities in class: The active participation of the student will be taken into account, answering the questions promptly posed by the teacher in the daily course of the class, their fluency and oral expression and the qualification of the exercises theoretical-practical to be solved both in the classroom and outside it. All activities will contribute in the same proportion to the total mark of said block, being valued from 0 to 10 points. At least 80% of said activities must be carried out to qualify for the continuous evaluation system.

Laboratory practices: In each one of the practices the previous preparation of the practice will be valued, which will be delivered on the day it is carried out, having a weight of 10% in this section; the dynamics followed for its correct execution and operation, as well as the problems raised in its development, the specific weight of this section being 30% of the total mark for the practice. The remaining 60% will be devoted to the qualification of the report presented, that is, if the required data is correct and the questions asked have been answered correctly. The score of each practice will be from 0 to 10 points and never less than 3, since, if it is not considered suspended and must be repeated in the session enabled for this purpose, correcting what is not correct. The final grade for all the practices will be the arithmetic mean of all of them.

Proposed works: Their approach and correct development, the writing and coherence of the treated, as well as the achievement of results and the final conclusions obtained, will be valued. The oral presentation and the defense of them will also be valued when presenting the works in public. The grade corresponding to the defense and the memory will be the arithmetic mean of both parties. The score will range from 0 to 10 points. The weight of the works will vary between 30% and 70% depending on the number of works proposed during the semester and the estimated work hours for their completion.

Written tests: They will consist of the typical written exam scored from 0 to 10 points. The final grade will be given by the arithmetic mean of the tests, as long as there is no unit grade below 3 points, in this case the activity will be suspended. The approach and the correct resolution will be valued, as well as the justification of the methodology used when solving the exercises. Particularizing, for each of the tests will have the following:

- Test 1: It will consist of one or two theoretical / practical exercises related to the content of topics 2 to 3.
- Test 2: It will consist of one or two theoretical / practical exercises related to the content of topics 4 to 5.
- Test 3: It will consist of one or two theoretical / practical exercises related to the content of topics 6 to 8.

The weight of the tests will respond to the following formula: TESTING NOTE = TEST1 ? (35%) + TEST2 ? (35%) + TEST3 ? (30%)

GLOBAL TEST

If the student does not opt ??for the continuous assessment system, either due to his personal situation, cannot adapt to the work rate required by the continuous evaluation system, has suspended or wants to increase his grade, having participated in said methodology of evaluation, following the regulations of the University of Zaragoza, a global test will be scheduled for both laboratory practices and a written exam.

In the same way as the continuous assessment methodology, the global assessment test must be aimed at verifying if the learning results have been achieved.

Students who choose the global assessment test must carry out the following qualifying activities:

Laboratory practice exam: It will consist of a test in which the student must solve, in the laboratory, a series of exercises of a level similar to the practices carried out during the continuous assessment, which will be evaluated from 0 to 10. The justification must also be submitted theoretical exercise as the results obtained during the practice. Its value in the final grade will be 15%.

Proposed works: During the course different works will be proposed to be done individually or in groups. They will be compulsory, both the memory of the works and the public exhibition / defense of them will be evaluated. The note corresponding to the defense and the memory will be the arithmetic mean of both parties. This activity will contribute up to 20% to the final grade, to take this grade into account, the works must be delivered on the dates set, if they are not delivered on time and form, they will be evaluated with a 0.

Written exam: It will consist of solving exercises of theoretical and / or practical application with similar characteristics to those solved during the conventional development of the subject, carried out over a period of three hours. This test will be unique with exercises representative of the topics, contributing 70% to the final grade for the course.

As a summary of the aforementioned, the following weighting table of the grading process of the different activities has been designed in which the global assessment test of the subject has been structured.

Activities of the global test system	Weighting
Laboratory practices	15%
Proposed works	15%
Written tests	70%

The course will have been passed based on the sum of the scores obtained in the different activities carried out, exceeding 50%, each contributing a minimum of 30%.

For those students who have suspended the continuous assessment system, but some of their activities, with the exception of written assessment tests, have been carried out may promote them to the global assessment test, and it may be the case that they only have to do the written exam.

All the activities included in the global assessment test, with the exception of the written exam, may be promoted to the next official call, within the same academic year.

The evaluation criteria to be followed for the activities of the global test will be the same as those defined for the continuous assessment system, taking into account that the written exam will consist of one or two exercises for each block.

The weighting of the notes of each block will be as follows:

TEST GRADE = BLOCK1 ? (35%) + BLOCK2 ? (35%) + BLOCK3 ? (30%)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

A strong interaction between the teacher/student is promoted. 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 methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

- Theory sessions: Theoretical activities taught in a fundamentally expository way by the teacher, in such a way that the theoretical supports of the subject are exposed, highlighting the fundamental, structuring them in topics and / or sections and relating them to each other.
- Practice sessions: The teacher solves problems or practical cases for illustrative purposes. This type of teaching complements the theory presented in the master classes with practical aspects.
- Laboratory sessions: The total group of the master classes will be divided into several, according to the number of students enrolled, so that smaller groups of two or three students are formed. The students will carry out tests, measurements, assemblies, etc. in the laboratories in the presence of the internship teacher.
- Group tutorials: Scheduled learning follow-up activities in which the teacher meets with a group of students to guide their autonomous learning tasks and to supervise directed work or that require a very high degree of advice from the teacher.
- Individual tutorials: These are carried out through personalized attention, individually, from the teacher in the department. They aim to help solve the doubts that the students encounter, especially those who for various reasons cannot attend group tutoring or need more personalized punctual attention. These tutorials may be face-to-face or virtual.

If classroom teaching were not possible due to health reasons, it would be carried out on-line.

4.2.Learning tasks

This course is organized as follows:

Generic face-to-face activities:

- **Theory sessions:** The theoretical concepts of the course are explained and illustrative examples are developed as a support to the theory when necessary.
- **Practice sessions:** Problems and practical cases are carried out, complementary to the theoretical concepts studied.
- **Laboratory sessions.** Teachers will supervise students' activities.

Generic non-face-to-face activities:

- Study and assimilation of the theory exposed in the master classes.
- Understanding and assimilation of problems and practical cases solved in practical classes.
- Preparation of seminars, resolution of proposed problems, etc.
- Preparation of laboratory practices, preparation of scripts and corresponding reports.
- Preparation of written continuous assessment tests and final exams.

Autonomous tutored activities.

Although they will rather have a face-to-face character, they have been taken into account apart from their idiosyncrasy, they will be mainly focused on seminars and tutorials under the supervision of the teacher.

Reinforcement activities.

Of marked non-face-to-face character, various activities that reinforce the basic contents of the subject will be conducted through a virtual teaching portal (Moodle). These activities may be personalized or not, controlling their performance through it.

4.3.Syllabus

This course will address the following topics:

THEORY

- 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.

PRACTICE

These workshops to be developed in the laboratory 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

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

An illustrative time distribution of a teaching week is as follows:

- 45 hours of lectures, with 40% theoretical demonstration and 60% solving type problems.
- 10 hours of laboratory workshop, in 1 or 2-hour sessions.
- 5 hours of written assessment tests, one or two hours 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.

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of EUPLA website and Moodle.

The weekly schedule of the subject will be officially published at:

<https://eupla.unizar.es/asuntos-academicos/calendario-y-horarios>

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

<https://eupla.unizar.es/asuntos-academicos/examenes>

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=28710&year=2020