Universidad Zaragoza

Year : 2019/20

28822 - Electrotechnics

Syllabus Information

Academic Year: 2019/20
Subject: 28822 - Electrotechnics
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 424 - Bachelor's Degree in Mechatronic Engineering
ECTS: 6.0
Year: 3
Semester: First semester
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

The subject and its expected results respond to the following approaches and objectives:
- Show the concepts and development of the three-phase systems of alternating current, studying them the different types of resulting circuits, from the analysis of networks.
- Introduce fundamental concepts about the electrical power system, classification of networks, as well as types of lines and conductors. Calculate 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.
- Determine the operation of the magnetic circuit and use it as a link between the theory of electrical circuits and electric machines.
- Show the general principles of electric machines. To deepen in the knowledge of the static electrical machines (transformer) and dynamic machines (DC and asynchronous machines).
- Make known 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 Mechatronic Engineering taught by EUPLA, framed within the group of subjects that make up the module called Electricity and Electronics and within this to the subject of Electrical Technology. It is a third year subject and compulsory in the fifth semester, with a teaching load of 6 ECTS credits.

It is understood that the student accesses the previous knowledge acquired in previous studies, which serve as the basis, being able to quote those related to the theory of electric and magnetic fields, the theory of electrical circuits, mathematics, physics, drawing, chemistry, etc.

This subject implies an important impact in the acquisition of the competences of the degree, in addition to providing additional useful training in the performance of the Mechatronic Engineer's functions related to the field of electricity.

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 and expression techniques are an essential tool to express technical ideas. The views, plans and circuit diagrams are documents commonly used in Electrical engineering.
-Physics: Knowledge of the principles and laws of electromagnetism allows understanding the operation of the elements, devices and systems under study in Electrical Engineering.
-Chemistry: Knowing the structure of matter and some chemical phenomena, helps advance in the study of Electrical Engineering
-Mathematics: Theorems, algorithms and strategies learned in this discipline, are of essential use in the approach and resolution of all calculations that are carried out in Electrical engineering.
-Electrical Engineering: Fundamental subject, which reveals the theorems and the necessary methodology to understand the behaviour of the elements, devices and systems under study in Electrotechnics.

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

This subject does not possess any normative prerequisite nor does it require specific complementary knowledge. Therefore, the aforementioned is understood from a formal point of view, although it is advisable to have studied the subjects related to the above-mentioned subjects before taking the subject of Electrotechnics.

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

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:

In a strong teacher/student interaction. This interaction is materialized through the distribution of work and responsibilities between students and teachers. However, it will have to be taken into account that to a certain extent students can mark their learning pace according to their needs and availability, following the guidelines set by the teacher. The present subject of Electrical Engineering is conceived as a unique set of contents but worked under three fundamental and complementary forms as they are: the theoretical concepts of each didactic unit, the resolution of problems or questions and the laboratory practices, supported in turn For another series of activities. The organization of the teaching will be carried out following the following guidelines:

? **Lectures**: Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamentals, structuring them in topics and or sections, interrelating them.

? **Practice Sessions**: 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 course 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 a 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.

? **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 that has 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 course will address the following topics:

- Theory.
- Practice.

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: Three-phase sinusoidal alternating current.
- TOPIC 2: Direct current lines.
- TOPIC 3: Single phase alternating current lines.
- TOPIC 4: Three-phase alternating current lines.
- TOPIC 5: Single-phase transformers.
- TOPIC 6: Three-phase transformers.
- TOPIC 7: Direct current motors.
- TOPIC 8: Three-phase asynchronous motors.

PRACTICAL CONTENTS.

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

- WORKSHOP 1: Study of voltages and currents in a three-phase system.
- WORKSHOP 2: Power measurement in a three-phase system.
- WORKSHOP 3: Direct start of a three-phase asynchronous motor
- WORKSHOP 4: Reversing the direction of rotation of a three-phase asynchronous motor.
- WORKSHOP 5: Star-delta starting a three-phase asynchronous motor.

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.

A summary of a weekly timetable guide can be seen in the following table. These figures are obtained from the subject file in the Accreditation Report of the degree, taking into account the level of experimentation considered for the said subject is moderate.

Activity	**Weekly school hours**
Lectures	3
Laboratory	1
Others activities	6

Nevertheless, the previous table can be shown in greater detail, taking into account the following overall distribution:

? 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 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**: Topics 1, 2, 3, y 4.

? **Written assessment test 2**: Topics 5, 6, 7 y 8.

The topics on which the works will be developed will be proposed in the third week, with their delivery and exhibition being carried out before the last two teaching weeks, during the course of the signature the dates will be specified.

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 those published officially on the School website.

The weekly schedule of the subject will be published officially on the School website.

4.5.Bibliography and recommended resources

Resources and materials used in the development of the subject are reflected in the following table:

Material	**Format**
Topic theory notes Topic problems	Paper/repository
Topic theory notes	

Topic presentations Topic problems Related links	Digital/Moodle E-Mail
Software	Pc's laboratory
Technical manuals	Paper/repository Digital/Moodle
Multimeters ammeters Voltmeters Power Meters Frequency Transformers. Rectifiers Oscilloscopes Single and three phase loads Engines Electrical switchgear	