28812 - Electrical Engineering

Información del Plan Docente

Academic Year	2016/17
Academic center	175 - Escuela Universitaria Politécnica de La Almunia
Degree	424 - Bachelor's Degree in Mechatronic Engineering
ECTS	6.0
Course	2
Period	First semester
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

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.

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The current subject, Electric Engineering, 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, but never with more than 20 students, in order to make up smaller sized groups.

· **Individual Tutorials.** Those carried out giving individual, personalized attention of the teacher. Said tutorials may be in person or online.

5.2.Learning activities

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 no more than 20 students.

— **Generic non-class activities** :

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● 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.

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 Workshop	1
Other Activities	6

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

— 45 hours of lectures, with 50% theoretical demonstration and 50% solving type problems.

— 11 hours of laboratory workshop, in 1 or 2 hour sessions.

— 4 hours of written assessment tests, two hour per test.

— 4 hours of PPT presentations.

— 34 hours of exercicies and tutorial works, divided up over the 15 weeks of the 1 st semester.

— 50 hours of personal study, divided up over the 15 weeks of the 1 st semester.

5.3.Program

The course is structured around two complementary components: theoretical and practical . The concepts and fundamentals of electrical circuits analysis , illustrated with actual examples, will be presented . The student participation through questions and brief discussions will be encouraged.
The contents of the theoretical classes are the following:

Chapter I	**Basic concepts.** Introduction, basic definitions. Main properties of networks. Notation and references. Components. Ideal generators. Current and voltage divider circuits. Groups of elements. Kirchoff laws. Regime types that can be given as a solution to find a network .
Chapter II	**Permanent Sinusoidal Regime analysis of elementary networks .** Introduction. Basic considerations of a sinusoidal signal. Representation of a sinusoidal signal. Phasor concept. Kirchoff laws in the frequency domain. Phasor relationships of passive components (R, L and C). Impedance phasor relationships. Response of a circuit to a sinusoidal excitation. Power in PSR. Response series circuits (R, L, C) in PSR. Magnetic coupling.

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Chapter III	**Circuit Theoremes.** Maxwell theorem. Thevenin and Norton theorems. Millman theorem. Helmholtz t heorems of equivalent generators. Overlap theorem. Mobility of generators. Delta-star and star-delta transformations.
Chapter IV	**Analysis of elementary networks in the time domain .** Introducción, Circuito RL simple Introduction, simple RL circuit. Properties of the exponential response. General RL circuit. Simple RC circuit. General RC circuit. RLC parallel circuit (unsourced). RLC series circuit (unsourced). The complete response of an RLC circuit. Circuit analysis using the Laplace Transform.
Chapter V	**Fundamental principles of electrical machines .** Introduction. Basics of electrical machines. Types of electrical machines. G eneral classification. Main characteristics of electrical machines. Performance and loss of electrical machines. Electromotive force induced in the windings. Electromagnetic torque.

5.4.Planning and scheduling

Schedule sessions and presentation of works
Lectures and problem resolution classes and laboratory workshop are according to schedule set by the center, which must be published before the start date of classes (http://www.eupla.es/) .
The teacher will inform about his hours of tutoring.
Other activities will be planned depending on the number of students and will be announced with time . It will be available on https://moodle.unizar.es/

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5.5.Bibliography and recomended resources

Bibliography (most, only in spanish):

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- al.. Electricidad, teoría de circuitos y magnetismo / Gonçal Fernández Mills, Julián Fernández Ferrer. 2ª ed., reimp. Barcelona : UPC, ETSEIB, 1997.

Other material:

Material	Format
Topic theory notes	Digital/Moodle
Topic presentations	E-Mail
Topic problems	

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Related links	