

30116 - Basic principles of electrical technology

Syllabus Information

Academic year: 2024/25

Subject: 30116 - Basic principles of electrical technology

Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
179 - Centro Universitario de la Defensa - Zaragoza

Degree: 425 - Bachelor's Degree in Industrial Organisational Engineering
563 - Bachelor's Degree in Industrial Organisational Engineering

ECTS: 6.0

Year: 2

Semester: Second semester

Subject type: Compulsory

Module:

1. General information

The subject develops the fundamentals of electrical circuit analysis and the principles of operation and applications of electrical machines. In the laboratory, basic electrical circuit instrumentation is used, with emphasis on evaluating and preventing electrical hazards.

Defense profile

This subject contributes to the training of Army Officers, providing the fundamental knowledge of electrical engineering and the necessary skills to analyze electrical problems, take measures and propose solutions.

2. Learning results

The student, in order to pass this subject, must demonstrate the following results...

1. Know the fundamentals of circuit theory and electrical machines.
2. Understand the principles of circuit theory and electrical machines and acquire the ability to apply them to the analysis of simple electrical circuit and electrical machine problems.

Through the achievement of the relevant learning results of this subject, the student will acquire the necessary ability to understand the operation of circuits, installations and electrical machines, to handle the basic electrical instrumentation, as well as to use the terminology of electrical engineering. On the other hand, the student will obtain the ability to evaluate and prevent risks, both their own and those of the people in their charge, when working with electrical installations.

This subject, which has a strong engineering character, lays the necessary foundations for the development of future subjects taught in the degree such as Fundamentals of Electronics and others included in the elective modules, in addition to offering a training with contents of immediate application and development in the labor and professional market. The skills acquired through it are essential for the design and implementation of any application, plant, process, etc. included in the field of Industrial Organization Engineering.

3. Syllabus

Company profile

Theoretical contents

- Topic 1: Basic electrical notions.
- Topic 2: Direct current.
- Topic 3: Single-phase sinusoidal alternating current.
- Topic 4: Three-phase sinusoidal alternating current.
- Topic 5: Single-phase transformers.
- Topic 6: Three-phase transformers.
- Topic 7: Direct current motors.
- Topic 8: Three-phase asynchronous motors.

Practical contents

Laboratory practices related to electrical measurements will be performed.

Defense profile

The contents of the subject are:

- Topic 1: Kirchhoff's Laws. Polarity references.

- Topic 2: Circuit elements.
- Topic 3: Energy and Power.
- Topic 4: Circuit analysis methods
- Topic 5: Fundamental theorems of circuit analysis.
- Topic 6: Analysis of sinusoidal steady-state circuits.
- Topic 7: Power in stationary sinusoidal regime.
- Topic 8: Balanced three-phase systems.
- Topic 9: Electrical machines.

Theme 3 will discuss Sustainable Development Goal 7 (SDG 7: Affordable and non-polluting energy).

4. Academic activities

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Bearing in mind that the degree of experimentality considered for this subject is low, the indicative time distribution of the academic activities for the 15 weeks of duration will be as follows:

- 45 hours of lectures, 40% of theoretical exposition and 60% of problem solving.
- 10 hours of laboratory practice.
- 5 hours of evaluation tests.
- 90 hours of study and personal dedication.

As well as group and individual tutoring, at the request of the students.

Defense profile

Participative lectures. Sessions to develop the content of the subject.

- Problem solving classes: Problem solving sessions and case studies to reinforce theoretical concepts.
- Laboratory practices: In which the theoretical concepts seen in the classes will be put into practice.
- Self-assessment exercises: In which students will be able to self-evaluate (in Moodle) their knowledge of the subject.
- Tutoring sessions: Individual sessions in which the teacher will help the student to solve theoretical or practical doubts.
- Assessment tests: Examinations consisting of problem solving.

Key dates will be reflected on the CUD and EUPLA websites.

5. Assessment system

Company profile

CONTINUOUS ASSESSMENT SYSTEM:

- Individual activities in class: They will be carried out at the end of each of the topics. At least 80% of of these activities must be carried out in order to be eligible for this evaluation system, due to their nature. Its minimum average grade will be 5 out of 10 points, for its contribution to 10% of the final grade.
- Laboratory practices: Its minimum average grade will be 5 out of 10 points, for its contribution to 20% of the final grade.
- Written tests: Its minimum average grade will be 5 out of 10 points, for its contribution to 70% of the final grade, as long as there is no grade lower than 3 points in any of the tests, in which case the activity will be considered failed. Two tests will be conducted:
 - Test 1. Topics 1, 2, 3 and 4.
 - Test 2. Topics 5, 6, 7 and 8.

GLOBAL ASSESSMENT SYSTEM.

- Laboratory practices: Its minimum average grade will be 5 out of 10 points, for its contribution to 20% of the final grade.
- Written examination: Its minimum grade will be 5 out of 10 points, for its contribution to 80% of the final grade.

Defense profile

FIRST CALL

CONTINUOUS ASSESSMENT, consists of 3 sections:

- **3 Written tests (20%, 30% and 40%):** assessment of the resolution of problems (it is necessary to know and apply the contents and methods exposed in the subject).
- **Self-assessable exercises (0%):** evaluation of problem solving via Moodle.
- **Laboratory practices (10%):** assessment of the realization of assemblies and measurements with real equipment and circuits.

GLOBAL ASSESSMENT, consists of 2 sections:

Students who do not pass the subject by continuous assessment or who would like to improve their grade, will have the right to take this global test prevailing, in any case, the best of the grades obtained.

It will consist of

- **3 Written tests (20%, 30% and 40%)**
- **Laboratory practices (10%)**

SECOND CALL

It will be a global test consisting of 2 sections:

- **Written test (90%)**
- **Laboratory practices (10%)**

ASSESSMENT CRITERIA

- They are established based on the learning results of the subject.

In order to pass the subject a minimum score of 5/10 must be obtained in each part. The grade for each section is obtained with the average (weighted where specified) of the exercises that compose it, with the requirement that each individual exercise must reach the grade of 3/10 in order to be averaged.

- The students will have assessment rubrics for the laboratory practices and the weight of each one of the exercises of each written test.

Assessment instruments:	RA-1	RA-2
Written tests	X	X
Self-assessment examples	X	X
Laboratory practices	X	X

6. Sustainable Development Goals

- 4 - Quality Education
- 5 - Gender Equality
- 7 - Affordable and Clean Energy