

28919 - Electrical engineering and rural electrification

Syllabus Information

Academic year: 2024/25

Subject: 28919 - Electrical engineering and rural electrification

Faculty / School: 201 - Escuela Politécnica Superior

Degree: 583 - Degree in Rural and Agri-Food Engineering

ECTS: 6.0

Year: 2

Semester: First semester

Subject type: Compulsory

Module:

1. General information

The main objective of the subject is to understand and be trained in the interpretation of the electro-magnetic phenomena underlying low voltage electrical installations in order to be able to evaluate and justify the choice of the elements that are part of these installations, having the necessary tools to carry out a low voltage electrical project in the agro-industrial field.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 () 2030 of the United Nations (<https://www.un.org/sustainabledevelopment/es/>), contributing to some extent to their achievement: Goal 7: Affordable and non-polluting energy, Goal 8: Decent Work and Economic Growth, Goal 9: Industry, innovation and infrastructure.

2. Learning results

- Classify, analyze, calculate and design the use of direct current and alternating current electrical circuits in single-phase and polyphase systems, which cover the needs of agricultural and livestock farms and agro-food industries.
- Analyze, calculate and design energy needs, electrical power and its distribution in farms, agribusinesses, food industries and green areas, giving priority to their energy efficiency (in line with goals 7.3 and 9.4)
- Design, calculate and define the link installations and electrical circuits that make up the low voltage electrical installations in low voltage electrical installations in farms, agri-food industries and green areas.
- Identify, analyze and justify a lighting installation to meet the needs of farms, agribusinesses, food industries, green areas and sports facilities.
- Identify, interpret, calculate, design and justify the elements of maneuver, measurement, protection and safety in low voltage installations in farms, food industries and green areas.
- Justify a low voltage electrical installation project in farms, agribusinesses, agri-food industries and green areas.

3. Syllabus

1. Electricity: general concepts.
2. Power and electrical energy.
3. Interactions between electric current and a magnetic field.
4. Direct current.
5. Alternating current.
6. R-L-C circuits in alternating current.
7. Three-phase systems.
8. Lighting technology.
9. Transformers.
10. Direct and alternating current machines.
11. Basic concepts of safety in electrical installations.
12. Low voltage electrical installations.
13. Low voltage electrical installation project.

4. Academic activities

Lectures: 30h

Theoretical-practical sessions in which the contents of the subject will be explained.

Problems and cases: 15h

Electrical circuits, electrical machines, protection elements, low voltage electrical design.

Computerized practices: 15h

Lighting technology, calculation of low voltage electrical installation components, single-line diagrams.

Personal study: 87

Assessment tests. 3

5. Assessment system

The subject will be assessed by means of a global face-to-face test. Its content will be adapted to the syllabus of the subject (theoretical sessions, problems and laboratory) and its realization will take place once the teaching semester is over, according to the date scheduled in the EPS exam calendar for the official calls of the corresponding academic year.

The final global test will consist of a face-to-face exam consisting of four blocks:

- Block 1: theoretical part, multiple-choice questions and short theoretical-practical questions. 40% of the final grade (minimum 3.5 out of 10).
- Block 2: practical part, problems on electrical applications and installations (part I). 40% of the final grade (minimum 4.0 out of 10).
- Block 3: practical part, problems on electrical applications and installations (part II). 10% of the final grade (minimum 4.0 out of 10).
- Block 4: practical part, dedicated to computerized practices. 10% of the final grade (minimum 5.0 out of 10).

For completing block 2, students will be able to use a form/guide provided by the instructor as support.

Blocks 3 and 4 may be passed during the semester (without prejudice to the student's right to take the final global test, notifying the responsible teacher with sufficient time in advance). For this purpose, the following complementary assessment activities are proposed:

- Block 3: Problem/case deliveries.
- Block 4: Laboratory session reports. During the sessions, exercises will be presented that students must complete using various software tools. Complementary report writing will not be necessary if students attend these classes, as the work will be completed during the sessions. In case of justified absence, it will be necessary to individually complete the proposed exercises and write a report or session summary.

Evaluation criteria:

- Understanding of laws, theories and concepts
- Correct use of units in quantities
- Clarity in the presentation of results
- The correctness of the approach, the results and their interpretation
- Spelling mistakes

The grade of blocks 1 and 2 will not be kept for the first and second summons. The grade of blocks 3 and 4 may be saved (if the student wishes) for successive examinations, corresponding to academic years other than the one in which it was obtained..

Calculation of the final grade:

The final grade (CF) out of 10 points, will be obtained by applying the following equation:

$$CF = (0.40 \times \text{grade block 1}) + (0.40 \times \text{grade block 2}) + (0.10 \times \text{grade block 3}) + (0.10 \times \text{grade block 4})$$

In order to pass ($CF > 5.0$) it is essential that: [grade block 1 > 3.5], [grade block 2 > 4.0], [grade block 3 > 4.0] and [grade block 4 > 5.0]

In the event that the above requirements are not met, the final grade will be obtained as follows: If $CF > 4$, the final grade will be: Fail (4.0)

If $CF < 4$, the final grade will be: Fail (CF)

Alignment with the SDGs:

The alignment with the SDGs will be evaluated in all four modules of the course.

Success Rates in Previous Courses:

The success rates for the course over the last three years are: 2020/21: 82.35%; 2021/22: 68.18%; 2022/2023: 89.58%.

6. Sustainable Development Goals

7 - Affordable and Clean Energy

8 - Decent Work and Economic Growth

9 - Industry, Innovation and Infrastructure