

60801 - Design and testing of machines and Integrated manufacturing systems

Syllabus Information

Academic year: 2023/24

Subject: 60801 - Design and testing of machines and Integrated manufacturing systems

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 532 - Master's in Industrial Engineering

ECTS: 6.0

Year: 1

Semester: First semester o Second semester

Subject type: Compulsory

Module:

1. General information

The subject is aimed at the acquisition of knowledge about the operation, sizing and calculation of electrical installations, both in high and low voltage.

These approaches and objectives are aligned with some of the Sustainable Development Goals, SDGs, of the 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>) and certain specific goals, in such a way that the acquisition of the learning results of the subject provide training and competence to the student to contribute to a certain extent to their achievement: Goal 7: Guarantee Access to Affordable, Safe, Sustainable and Modern Energy for All.

2. Learning results

Upon completion of the subject, the student will be able to know:

- Concept of electrical installation structure
- Concept of low and high voltage electrical networks
- Constituent elements.
- Concept of overcurrent, overvoltage and insulation coordination
- Concept of electric power generation systems
- Concept of electric power transformer stations.
- Legislation, applicable regulations.

Also:

- How to select and calculate constituent elements of electrical installations
- How to calculate the short-circuit currents, and select the appropriate protection elements.
- How to calculate the ground connections of the electrical installations, and select the protection elements against indirect contacts.
- How to size the electrical networks.
- How to interpret and select the necessary equipment with the help of technical documentation.
- How to transmit the criteria and design solutions and calculations for electrical installations.
- How to interpret the specifications regarding electrical installation legislation.

3. Syllabus

Introduction to the power electrical system.

1. Low voltage distribution:
 - a. Low voltage distribution networks: design and calculation.
 - b. Low voltage indoor installations.
 - c. Short circuits according to UNE EN 60909.
 - d. Low voltage switchgear.
 - e. Grounding.
 - f. Reactive power compensation.
 - g. Neutral connection schemes.
2. Distribution in medium and high voltage:
 - a. Medium and high voltage networks.
 - b. Grounding systems.
 - c. Isolation coordination.
 - d. Supply quality.
 - e. Transformation centres.
3. Introduction to the electric market.
 - a. Tariffing.

4. Academic activities

Master classes (45 hours).

Sessions for the explanation and presentation of contents. The concepts and principles related to the contents of the subject will be presented and illustrated with real examples. Students will participate in the development of problems and cases. These will be coordinated with the theoretical content.

Laboratory / high voltage facility visits (15 hours).

Students will calculate, simulate, and verify the operation of electrical installations in different operating regimes. They will also be able to see the different switchgears. Students will have a script for the practice, which they will need to prepare in advance. Visits will be made to high voltage electrical facilities.

Assessment (3 hours).

Teaching assignments (34 hours).

Periodically, students will have to develop exercises and cases on their own. These can be found in the Teaching Digital Ring (ADD) (<http://moodle.unizar.es>).

Personal study (53 hours).

5. Assessment system

The evaluation of the subject will be of a global nature will the following structure:

1. Assessment during the teaching period:

1.1- Laboratory practices (10%)

Laboratory practices will be evaluated in the laboratory sessions. Assessment criteria will be:

- Previous preparation of the practice.
- Initiative and participation in the practice sessions.
- Correction and quality of the report, along with the provided technical documentation.

The rating for this activity will be from 0 to 10 points and will represent 10% of the overall grade. The student who does not attend a session at the scheduled time (except due to a justified reason) will achieve a grade of 0 for it.

1.2- Tutored Works (15%)

In order to encourage the student's continuous work, in addition to laboratory practices, the following activities will be carried out:

A supervised work related to some of the topics of the subject (groups of 2-3 students). Deadlines will be set and published on the ADD. The grading of these works and activities will be from 0 to 10 points and will represent 15% of the overall grade.

1.3- Written exam (75%)

There will be a written exam, graded from 0 to 10 points. It will account for 75% of the student's overall grade.

Final grade of the subject

In order to pass the subject, it is necessary to obtain a final grade equal to or higher than 5 points. The final grade consists of:

$$\text{Final Grade} = 0.75 * (\text{Written Exam}) + 0.10 * (\text{Laboratory Practices}) + 0.15 * (\text{Tutored Work})$$

2. Overall assessment:

It will be carried out through a written exam with a theoretical part (multiple choice) and a practical part (problems) in each official call. The rating of this activity will be from 0 to 10 points, and to pass the subject it is necessary to obtain a final grade equal to or greater than 5 points.

This global assessment test, to which all students are entitled, is primarily intended for those who do not wish to undergo continuous assessment; and will constitute the assessment method in the second official call.