

30019 - Electrical Machines

Syllabus Information

Academic year: 2023/24

Subject: 30019 - Electrical Machines

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 436 - Bachelor's Degree in Industrial Engineering Technology

ECTS: 6.0

Year: 2

Semester: Second semester

Subject type: Compulsory

Module:

1. General information

The subject is oriented to the acquisition of basic knowledge about rotating electrical machines and transformers, both single-phase and three-phase.

The evaluable contents of this subject do not contribute directly to the achievement of the Sustainable Development Goals, but they are essential for the subsequent knowledge that is more directly related to them.

Basic knowledge of mathematics and general physics is required to take this subject, as well as having passed the subject of Fundamentals of Electronic Engineering.

With respect to the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>), the evaluable contents of this subject do not contribute in a direct way to their achievement. However, they are essential to inform the subsequent knowledge of the rest of the degree that does relate more directly to the SDGs and the 2030 Agenda.

2. Learning results

Understand the operational principles of electrical machines and have the ability to apply them to the analysis of steady-state operation.

Be skilled in the use of analytical methods and modeling techniques for the analysis of electrical machines.

Have the skills to work in an electrical engineering laboratory.

Understand the codes of practice and industry standards for electrical machines.

3. Syllabus

Transformers: Ideal and real single-phase transformer. Equivalent circuit. Voltage drop. Performance. Three-phase banks. Three-phase transformers. Parallel work. Autotransformers. Measuring and protection transformers.

Fundamentals of rotating machines: Constructive aspects. Principle of reversibility. Magnetic fields created by single-phase and three-phase systems. Induced e.m.f. Motor selection.

Asynchronous machines: Constructive aspects. Operating principle. Equivalent circuit. Power balance.

Mechanical characteristic. Start-up. Speed variation.

Synchronous machines: Constructive aspects. Operating principle. Vacuum operation. Operation at load. Induced reaction. Linear analysis: Behn Eschenburg method. Equivalent circuit. Island operation.

Operation in an infinite power network.

4. Academic activities

Lectures (45 classroom hours): Sessions of exposition and explanation of the theoretical contents coordinated with the development of problems and practical cases. The student will have the material prepared by the faculty available in the Digital Teaching Ring.

Laboratory practices (15 classroom hours). The student will have scripts available in the Digital Teaching Ring.

Individual study (80 hours).

Assessment tests (6 hours)

5. Assessment system

An assessment system is offered per term consisting of:

* Laboratory practices (15% of the final grade). (Minimum 5 out of 10).

* Evaluable activities (15% of the final grade). The ADD will specify the contents and assessment criteria.

Exam Call (70%). (Minimum 5 out of 10). Written test scheduled on the dates of the exam calendar , with theory (50%) and problems (50%). A minimum score of 3.5 out of 10 on theory and on problems is required. Wrong answers in theory are negatively evaluated.

Global assessment: For those students who do not opt for assessment through term. Consists of:

Exam Call (80%). (Minimum 5 out of 10). Written test similar to the assessment through term test. A minimum score of 3.5 out of 10 in theory and problems is required . Wrong answers in theory are valued negatively.

* Practical exam (20% of the final grade). (Minimum 5 out of 10). Consists of: Written test exam, written exam of development (in both it is necessary to obtain a minimum grade of 5 out of 10). If both are passed, an exam will be carried out in the laboratory.