

29606 - Physics II

Syllabus Information

Academic year: 2023/24

Subject: 29606 - Physics II

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 430 - Bachelor's Degree in Electrical Engineering

ECTS: 6.0

Year: 1

Semester: 107-Second semester

430-First semester o Second semester

Subject type: Basic Education

Module:

1. General information

The subject introduces the basic concepts of electromagnetic theory, which support most of the subjects of the degree in electrical engineering.

Its transversal objective is to train students in the systematization of study and scientific work.

Therefore, after taking the subject the student will improve their ability to:

- Pose some physical problems in mathematical form and schematize them graphically.
- Use mathematics as a tool to express some physical ideas
- Apply the laws of electromagnetism to problems of their specialty, especially electrical machines, lines and electrical installations
- Simplify some practical problems to their elementary physical basis.

It is convenient to have a mathematical basis in differential and integral calculus, for this reason we recommend taking Mathematics I and Physics I before taking this one.

This is a basic subject whose evaluable contents by themselves do not yet provide the student with direct capabilities to contribute to the achievement of the 2030 Agenda. However, they are essential to base the subsequent knowledge of the rest of the degree that is more directly related to the SDGs and therefore the 2030 Agenda.

2. Learning results

- Knows the fundamental concepts and laws of fields, waves and electromagnetism and their application to basic engineering problems
- Analyse problems that integrate different aspects of physics, recognizing the physical fundamentals underlying a technical application, device or real system.
- Know the units, orders of magnitude of defined physical quantities and solve basic engineering problems, expressing the numerical result in the appropriate physical units.
- Correctly use basic methods of experimental measurement or simulation and treat, present and interpret the data obtained, relating them to the appropriate physical magnitudes and laws.
- Use bibliography, by any of the means currently available, and use clear and precise language in their explanations of physics questions
- Correctly apply the fundamental equations to various fields of physics and engineering in the field of electromagnetism and waves
- Know the main properties of electric and magnetic fields, the classical laws of electromagnetism that describe and relate them, their meaning and their experimental basis
- Know and use the concepts related to capacitance, electric current, and mutual induction and self-induction, as well as basic electrical and magnetic properties of materials.
- Know the wave equation, the characteristic parameters of its basic solutions and their energetic aspects. Recognize the properties of electromagnetic waves, the basic phenomena of propagation and superposition, the electromagnetic spectrum.

3. Syllabus

Part I: Electrostatics

1. Electric field of charged objects. Gauss's Law
2. Electrical potential difference
3. Calculation of capacitor capacitance

4. Dielectric breakdown

Part II: Conduction and static magnetic field

1. Electric current density and intensity
2. Resistance calculation
3. Electromotive force of a generator
4. Magnetic field calculation using Ampère's Law
5. Magnetic force

Part III: Electromagnetism and waves

1. Magnetic field flux
2. Faraday and Lenz Law
3. Self-induction
4. Maxwell's equations
5. Introduction to waves
6. Electromagnetic waves

4. Academic activities

Master classes of theory: 20 hours

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

Master problems: 10 hours

Solving sample problems to illustrate the application of the theory.

Problem Workshops: 12 hours

Problem solving through teamwork.

Laboratory practices: 12 hours

Experimental set-ups and measurements for the verification of various aspects of the theory.

Continuous evaluation tests: 12 hours.

Personal study. 84 hours.

5. Assessment system

Students can choose between two options for the evaluation of the subject

Option 1: (Overall evaluation)

As a general rule for students who follow the subject independently of the development of the classes or do not wish to participate in the proposed activities, the final grade will be obtained in the exams of the official calls.

Option 2: (Continuous evaluation)

It is an evaluation system, linked to the active/cooperative teaching/learning procedure used. For this purpose, it is necessary to follow the activities proposed in class.

In this case the final grade will be composed as follows:

Final grade = 60 % Class_Activities_grade + 40 % Final_subject_exercise_grade

It will be necessary to obtain a minimum of 4 points out of ten in the final exercise in order to pass the subject.