Universidad Zaragoza

Academic Year/course: 2023/24

30006 - Physics II

Syllabus Information

Academic year: 2023/24
Subject: 30006 - Physics II
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 436 - Bachelor's Degree in Industrial Engineering Technology
ECTS: 6.0
Year: 1
Semester: 436-First semester o Second semester
107-Second semester
Subject type: Basic Education
Module:

1. General information

Physics II introduces the conceptual bases of electricity, magnetostatics, electromagnetism and wave phenomena . Therefore, it constitutes the physical training of support of several compulsory and optional subjects of the degree.

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 directly to their achievement. However, they are essential in order to base the subsequent knowledge of the rest of the degree program that is more directly related to the SDGs and the 2030 Agenda.

2. Learning results

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

1. -Know the fundamental concepts and laws of fields, waves and electromagnetism and their application to basic engineering problems.

2. -Analyze problems integrating different aspects of Physics, using a global vision and knowledge of it, being able to discern the various physical fundamentals underlying a technical application, device or real system.

3. -Know the units and order of magnitude of physical quantities defined in the different parts of matter.

4. -Solve in a complete way physics exercises and problems, reaching a correct result and expressing it in the appropriate physical units.

5. -Correctly use the basic methods of experimental measurement and process, present and interpret the data obtained, relating them to the appropriate physical magnitudes and laws.

6. -Use bibliography, by any of the means currently available, and use clear and precise language in your explanations of physics questions.

These general results should, in turn, be translated into more specific achievements. Thus, each studentis expected to:

1. -Learn the main properties of electric and magnetic fields, the classical laws of electromagnetism that describe and relate them, their meaning, their experimental basis and their application to basic engineering problems.

2. -Know and use the concepts related to capacitance, electric current, self-induction and mutual induction, as well as electrical and magnetic properties of materials and their characteristic parameters.

3. -Obtain and manage the energy associated with magnetic and electric fields.

4. -Understand the generalization of Ampère's law and that Maxwell's equations, in integral form, represent the laws studied in electromagnetism.

5. -Recognize the space-time dependence associated with wave propagation phenomena, know its one-dimensional differential equation and its harmonic solutions.

6. -Know the energetic-geometric aspects in three-dimensional waves, the basic phenomena related to the propagation speed and wave superposition (interference and diffraction).

7. -Be able to analyze the propagation of mechanical waves in fluids and solids.

8. -Know the basic mechanism of hearing, the auditory response curves and use the concept of loudness level correctly of acoustic intensity level.

9. -Recognize the main properties of the waves of each region of the electromagnetic spectrum, their sources of generation and detection devices. In particular, to identify the optical spectrum, handle the phenomena of reflection, refraction, dispersion, polarization and the basic aspects of the interaction of light with matter.

3. Syllabus

Part I (Electricity)

1. Electrostatic field and potential.

2. Gauss's Law.

3. Electrostatic field in the presence of conductors.

4. Electrostatic field in the presence of dielectrics.

5. Electric current.

Part II (Magnetostatics)

6. Magnetic induction, B.

7. Ampère's law in vacuum.

8. Magnetostatic field in the presence of matter.

Part III (Electromagnetism)

9. Electromagnetic induction.

10. Maxwell's equations.

Part IV (Waves)

11. Wave motion.

12. Wave superposition.

13. Acoustics.

4. Academic activities

Lectures: 36 hours

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

Laboratory practices: 10 hours

Experimental demonstration of some of the physical phenomena studied in the subject.

Problem solving and case studies: 14 hours

Sessions devoted entirely to problem solving.

Supervised work: 15 hours

Group work that deepens in some of the learning outcomes that define the subject.

Personal study: 69 hours

Assessment tests: 6 hours

5. Assessment system

A continuous assessment system, which will be carried out throughout the learning period. Thus, the final grade for the course is obtained from:

1) Two intermediate midterm tests, consisting of the resolution of short questions and problems. Each one accounts for 35% of the total grade.

2) The tutored work (10% of the total grade).

3) Laboratory practices, which account for 20% of the total grade. They are evaluated on the basis of questionnaires given to at the end of each session. The total grade is the average of all the questionnaires, provided that all sessions are attended.

In order to pass the subject, it is necessary to obtain at least 5 points out of 10 in the final grade resulting from all the tests, **in addition to a minimum score of (a) 4 points out of 10 in each of the partial tests and (b) 5 points out of 10 in the laboratory practicals**. If conditions (a) and (b) are not met, the maximum grade that can be obtained is 4.6 points out of 10 (Fail).

Students who do not pass the subject through the continuous assessment system, or who wish to improve their grade, may take a global test, the date of which will be established in the academic calendar. It will consist of:

1) A written test with a structure analogous to that of the intermediate tests (up to 70% of the total grade, depending on the part of the grade already obtained that is used).

2) A practical laboratory exam, in which one of the proposed practices must be completed individually and without the teacher's help (20% of the total grade).

The conditions to pass the subject through the global test are identical to those of the continuous assessment.