

## 29906 - Physics II

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 29906 - Physics II

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 435 - Bachelor's Degree in Chemical Engineering

**ECTS:** 6.0

**Year:** 1

**Semester:** 435-First semester o Second semester

107-Second semester

**Subject type:** Basic Education

**Module:**

### 1. General information

The general goal is to provide students, from an applied perspective, with the physical fundamentals of Electricity, Magnetism, Electromagnetism, Wave Motion, Acoustics and Physical Optics, enabling the student to approach and understand the technologies commonly used in Chemical Engineering and developed in later terms.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (<https://www.un.org/sustainabledevelopment/es/>), specifically, the learning activities planned in this subject will contribute to the achievement of Goal 4.7 of objective 4, and Goal 13.3 of objective 13.

### 2. Learning results

- Know the fundamental concepts and laws of fields, waves and electromagnetism and their application to basic engineering problems basic engineering problems.
- Analyse problems that integrate different aspects of physics, recognizing the various physical foundations that underlie a technical application, device or real system .
- Know the units and orders of magnitude of the physical quantities involved and solves basic engineering problems, expressing the result in the appropriate SI physical units .
- Correctly use basic methods of experimental measurement or simulation and treats, presents and interprets the data obtained, relating them to the magnitudes and physical laws involved .
- Use bibliography, by any of the means currently available, and use clear and precise language in their explanations of physics questions
- 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 uses the concepts related to capacitance, electric current, self-induction and mutual induction, as well as basic electrical and magnetic properties of materials .
- Know the wave equation, the characteristic parameters of its basic solutions and the energetic aspects of them. Analyse the propagation of mechanical waves in fluids and solids and knows the fundamentals of acoustics.
- Recognize the properties of electromagnetic waves, the basic phenomena of propagation and superposition, the electromagnetic spectrum, the basic aspects of light-matter interaction and the applications of these phenomena in technology

### 3. Syllabus

Unit 1. Electrostatic Interaction.

Unit 2. Potential and electrical potential energy.

Unit 3. Electric field in conductors. Capacity.

Unit 4. Electric field in dielectrics.

Unit 5. Electric current.

Unit 6. Magnetic Forces and B Field.

Unit 7. B field sources. Biot-Savart law. Ampère's Law.

Unit 8. Magnetic field in materials. Magnetization and H field.

Unit 9. Electromagnetic induction: Faraday-Lenz Law.

Unit 10. Inductance and magnetic field energy.

Unit 11. Electromagnetic waves.

Unit 12. Kinematics of wave motion.

Unit 13. Mechanical waves.

Unit 14. Interference.

Unit 15. Reflection, diffraction and absorption. Black body and global warming.

#### 4. Academic activities

They are divided into

1. -**Lectures** on theory and case studies (30 hours)
2. -**Problem** solving by the teacher and the students, who can work on them in groups (15 hours)
3. -**Laboratory practices** (12 hours) where experiments related to the physical phenomena worked on in the lectures will be carried out
4. -Directed academic **work**, which will be based on the results of the first midterm.
5. Personal study and work of the student (90 hours)
6. Tutorials
7. Assessments in official calls (3 hours).

#### 5. Assessment system

- **Laboratory practices (A)**. The student will present an internship report with the experimental results and the analysis of the data. Experimental skills and attitude in the laboratory will also be assessed.
- **Partial tests (B)**. At least one midterm exam of a theoretical-practical nature will be planned. The student's problem solving skills and the execution of the problems, as well as having achieved a correct result and taking into account the points described in the Learning Results section, will be assessed at.
- **Supervised work (C)**. The completion of a supervised work will be proposed as an option. Access to this work may be limited to those students who have obtained a grade  $\geq 5.0/10$  in the first midterm exam.

Official Calls:

1. -**Final test(D)**. Theoretical-practical written test of analogous character to the midterm exams (B), and in which will differentiate as many blocks as midterm exams have been performed. Students who have previously passed some of these passed some of these blocks (grade  $\geq 5.0$ ) throughout the teaching period, will not be obliged to take the tests again in this final test, maintaining the minimum grade obtained in those midterm exams .

-To pass the subject, the grade obtained in this section must be  $\geq 4.5$  out of 10.

2. -**Final test of laboratory practices (E)**. This test is open to those students who have not passed the following tests

-(grade  $< 5.0$ ) activity A. It will consist of a practical laboratory test, in which the results will be assessed

obtained and their analysis. To pass the subject, grade E  $\geq 5.0/10$ . If during the development of the practical test , supervised by a teacher, the student does not comply with the safety rules in the laboratory, the test will be immediately interrupted and the student will be assigned the final grade of failure.

**Calculation of the final grade: A (or E, if applicable) = 20%; D = 80%; A (or E, if applicable) = 20%; D = 80%**

Those who have passed the subject according to the above calculation and, in addition, have participated in activity C, will receive, according to the quality of the work, a bonus on the final grade of up to 1 point.

In those cases in which the student obtains the qualitative grade of failure due to non-compliance with any of the restrictions mentioned above, the quantitative grade will take into consideration the rest of the activities , not exceeding the final grade of 4.0 assessment activities, not exceeding the final grade of 4.0.