Universidad Zaragoza

Academic Year/course: 2024/25

29906 - Physics II

Syllabus Information

Academic year: 2024/25
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.

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

The course is divided into the following activities:

- Lectures and Practical Case Studies (30 hours): These sessions will cover theoretical concepts and practical examples.
- Problem Solving by the Professor and Students (15 hours): Problems will be solved by both the professor and the students, who will have the opportunity to work in groups.
- Laboratory Practices (12 hours): Experiments related to the physical phenomena discussed in the lectures will be conducted.
- Directed Academic Work: Assignments will be based on the results of the first partial exam.
- Personal Study and Work by the Student (90 hours): This includes time for independent study and completion of assignments.
- Tutorials: One-on-one or small group sessions to provide additional help and clarification on course material.
- Evaluations during Official Exam Periods (3 hours): Time allocated for official examinations.

5. Assessment system

- **Laboratory Practices** (**A**): Students must submit reports of their practical sessions, including experimental results and data analysis. Evaluation of this component includes assessment of these reports and knowledge of experimental measurement methods in the laboratory. To receive a positive evaluation in A, the following are required: i) Attendance at all six practical sessions. ii) Timely submission of the reports. If a student fails to meet either requirement or scores below 5 out of 10 on the average of the reports, they may opt to take a final laboratory practice exam.

- **Partial Exams** (**B**): At least one theoretical-practical partial exam will be planned. The assessment will focus on problem-solving skills, execution, and achieving correct results, considering the points described in the Learning Outcomes section.
- **Supervised Projects** (**C**): An optional supervised project will be offered. Access to this project may be limited to students who score 5.0 or higher out of 10 on the first partial exam.

Official Evaluations:

- **Final Exam** (**D**): A written theoretical-practical exam similar to the partial exams (B), with sections corresponding to the number of partial exams conducted. Students who have already passed any sections (with a score of 5.0 or higher) during the teaching period will not need to retake those sections in the final exam. To pass the course, the score in this section must be 4.5 or higher out of 10.
- **Final Laboratory Practice Exam** (**E**): Students who did not pass activity A (with a score below 5.0) will take this practical lab exam, which evaluates the results obtained and their analysis. To pass the course, a **score of 5.0 or higher out of 10** in **E is required**. If a student fails to adhere to safety rules during the exam, supervised by a professor, the exam will be immediately terminated, resulting in a failing grade.

Calculation of the Final Grade:

- A (or E if applicable) = 20%
- D = 80%

Students who pass the course and also complete activity C will receive a bonus of up to 1 point on their final grade based on the quality of the project.

If a student receives a failing grade due to not meeting any of the restrictions mentioned, the quantitative grade will consider the other evaluation activities but will not exceed a final grade of 4.0.

6. Sustainable Development Goals

7 - Affordable and Clean Energy
9 - Industry, Innovation and Infrastructure
13 - Climate Action