Universidad Zaragoza

Academic Year/course: 2023/24

27203 - Physics

Syllabus Information

Academic year: 2023/24
Subject: 27203 - Physics
Faculty / School: 100 - Facultad de Ciencias
Degree: 452 - Degree in Chemistry
ECTS: 12.0
Year: 1
Semester: Annual
Subject type: Basic Education
Module:

1. General information

The subject aims to provide the student with a basic training in general aspects of Physics useful in Chemistry, acquiring knowledge in Classical Mechanics, Thermodynamics, Electrostatics, Electromagnetism and Optics.

The stated objectives and learning results are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (https://www.un.org/sustainabledevelopment/es/):

- Goal 4: Quality Education.
- Goal 8: Decent Work and Economic Growth
- Goal 9: Industry, Innovation and Infrastructure

Physics is an instrumental subject for graduates in Chemistry, being fundamental to take subjects of higher years such as Analytical Chemistry, Physical Chemistry or Materials Science.

It is recommended to have taken Physics and Mathematics in the 2nd year of Baccalaureate or equivalent.

2. Learning results

- Use the basic notation and language used in Physics.
- Know the basic laws of physics and apply them in appropriate situations.
- Work with particle systems and solve the two-body problem.
- Apply conservation theorems in collisions.
- Interpret potential energy curves and analyse examples in simple molecular systems.
- Derive some macroscopic properties of gaseous systems from microscopic behaviour.
- Apply the principles of thermodynamics.
- Calculate electrostatic fields and potentials of point or highly symmetric charge distributions.
- Analyse the effects of electrostatic fields on different types of materials.
- Solve simple DC circuits and apply Ohm's law.
- Calculate the effects of magnetic fields on charges and currents, as well as on different types of materials.
- Calculate the magnetic field produced by moving charges and current distributions with high symmetry. Apply the Faraday-Lenz law.
- Work with electromagnetic waves: propagation, emission and absorption and know the concept of photon.
- Analyse the propagation of light in different material media and use the phenomena of interference and diffraction.
- Forming images in simple optical systems.
- Value the limitations of Classical Physics and introduce in a simple way the quantification of some magnitudes.

3. Syllabus

I. CLASSICAL MECHANICS

1. Kinematics
2. Dynamics of a particle system
3. Conservative forces and potential energy
4. Oscillations

II. THERMODYNAMICS

5. Kinetic theory of gases
6. Heat and the first principle of thermodynamics
7. Thermodynamic cycles and second principle of thermodynamics

III. ELECTROSTATICS

8. Electrostatic field and potential

9. Conductors and dielectrics

IV. ELECTROMAGNETISM

10. Electric current

11. Magnetic field

12. Magnetic induction

13. Magnetic properties of matter

14. Electromagnetic field and electromagnetic waves

V. OPTICS

15. Propagation of light in isotropic media

16- Light polarization

17- Interference and diffraction

4. Academic activities

Lectures: 80 hours

Theoretical-practical sessions on basic physics concepts.

Problems and cases: 30 hours

Problem solving and case study analysis in small groups in the classroom.

Laboratory practices: 10 hours

Demonstration of physical phenomena in the laboratory.

Preparation of practice reports: 10 hours

Personal study supervised in tutoring by the teacher: 160 hours. Of these, 25 hours may correspond to work or supervised activities on specific aspects of the subject´s syllabus proposed by the teacher. Its realization is voluntary.

Assessment tests. 10 hours (6 hours of exams and 4 hours of progressive evaluation tests).

5. Assessment system

The evaluation of the subject is done by means of:

a) Grades P1 and P2 of the two exams corresponding to the contents of each semester. In each exam there is a part of theory, with questions of understanding and application of concepts, and a part of problem solving with numerical data. Both P1 and P2 exams will be held on the evaluation dates corresponding to each of the two official exam dates . However, at the end of the first semester the option of taking the P1 partial exam will be offered. If it is passed, it will allow eliminating these topics from the global test.

b) Grade L corresponding to a laboratory exam, which can be replaced by the reports of description, presentation of results, analysis and conclusions of the practices carried out during the term.

The final grade (C) is obtained as follows: C = 0.1*L + 0.9*(P1+P2)/2.

The following minimum grades are required to pass the subject:

C: 5,0.

L: 3.0 (overall and in each of the practice reports).

P1, P2: 4.5 in each, minimum of 3.0 in each part of theory and problems.

If C is higher than 5.0 but the other requirements are not met, the final grade will be 4.9.

The obtaining of a continuous evaluation grade T from periodic tests, proposed works and participation of the student, may improve the final grade by the following expression:

C = 0.1*L + 0.2*T + 0.7*(P1+P2)/2

All grades obtained during a term will be kept for all the exams corresponding to the academic year in which they were obtained.