Universidad Zaragoza

Academic Year/course: 2023/24

29901 - Physics I

Syllabus Information

Academic year: 2023/24
Subject: 29901 - Physics I
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 435 - Bachelor's Degree in Chemical Engineering
ECTS: 6.0
Year: 1
Semester: First semester o Second semester
Subject type: Basic Education
Module:

1. General information

Physics I includes the fundamentals of **Newtonian mechanics**, such as the laws of conservation of energy, linear momentum and angular momentum, with their applications in problems of solid dynamics, harmonic oscillators and mechanical energy oriented to the study of energy analysis of machines and devices. This subject of basic training is focused as a basis for advanced subjects of the degree.

These fundamentals are aligned with some of the **Sustainable Development Goals, Agenda 2030** in such a way that the learning results provide tools for their achievement, specifically **Goal 7** (Objective 7.3) of energy efficiency and **Goal 12** (Objective 12.4 and 12.5) Ensure sustainable consumption and production patterns .

2. Learning results

General learning results:

- Knows the**fundamental concepts and laws of mechanics** and thermodynamics and their application to basic engineering problems .

- Analyze problems that integrate different aspects of physics, recognizing the various physical fundamentals underlying a technical application, device, or real system .

- Knows the **units,** orders of magnitude of defined physical quantities and solves basic engineering problems, expressing the numerical result in the appropriate physical units.

- Correctly uses basic methods of experimental measurement or simulation and treats, presents and interprets the data obtained, relating them to the appropriate physical magnitudes and laws.

- Manages a specific language of Newtonian mechanics to clearly express concepts and solve problems of the subject

- **Uses bibliography,** both paper and electronic, from any of the local or international information sources available .

Specific learning results:

- Correctly apply the **fundamental equations of mechanics** to various fields of physics and engineering: kinematics, rigid solid dynamics, oscillations and fluids

- Understand the meaning, usefulness and relationships between **magnitudes, moduli and fundamental elastic coefficients** used in solids and fluids

- Perform **mass and energy** balances correctly in fluid motions in the presence of basic devices

- Correctly uses the concepts of **temperature and heat**. They apply them to calorimetric problems, of expansion and heat transfer.

- Apply the **first and second principles of thermodynamics** to processes, basic cycles and thermal machines

3. Syllabus

MECHANICS

§1. Kinematics. Reference systems. Relative motion.

§ 2. Dynamics of a particle.

Newton's Laws. Inertial and non-inertial systems. Special forces: friction, spring, gravitational.

Work and energy.

Linear and angular momentum.

§ 3. Dynamics of a particle system.

Center of masses. Conservation of linear and angular momentum.

§ 4. The rigid solid.

Moment of Inertia. Rotational dynamics.

§ 5. Simple mechanical oscillations.

Free, damped and forced harmonic oscillator.

§ 6. Fluid Mechanics.

Ideal fluids. Hydrostatics and Hydrodynamics.

§ 7. Heat and temperature. Heat and heat capacity.heat transmission.

§ 8. Internal energy, variables and equations of state.

§ 9. Second principle of thermodynamics. Thermal machines.

4. Academic activities

Master classes: **3 hours of classes per week** in a schedule assigned by the center.

Laboratory practices: **4 two-hour** laboratory **sessions** with subgroups of the theory group.

Seminar activities: Problems proposed in the master classes. There will be **7 one-hour sessions**, with critical problemsolving.

Study and personal work, which is valued at about **85 hours**, for the study of theory and problem solving

Tutoring: The teacher will publish a schedule of attention to students for consultations, in an orderly waywill establish a personalized order in each schedule, avoiding overlapping of tutorials. When a student is unable to attend within these schedules, and prior communication to the teacher by the student,a schedule adapted to the student's possibilities will be established.

5. Assessment system

A minimum of 2 (two) written midterm exams will be given throughout the semester. The minimum passing grade will be of 5 points. Each of these tests will contribute in identical fractions to the sum of the total of the midterm exams. This total will account for 40% of the final grade.

At the end of the term there will be a Global test, which will constitute 40% of the final grade, and will be approved with a minimum grade of 5 (five) points out of 10 (ten), . Those students who have not passed one or more of the midterm exam must take a global written test to be held at the end of the semester, according to the test calendar of the center.

To pass the subject it will be necessary to obtain at least five points in each of the grades, which will result in an overall average grade equal to or higher than 5 (five) points. However, an overall average of 5 (five) points is not a sufficient conditionfor approval, and the student must pass each individual test with a minimum of 5 (five) points.

There will be a laboratory test, which will constitute 10% of the final grade, which must be passed in order to pass the course subject, and whose minimum passing grade will be 5 points.

Those students who choose not to follow the above assessment process may sit for a final exam for 100% of the grade 100% of the grade.