Universidad Zaragoza

Academic Year/course: 2023/24

30002 - Physics I

Syllabus Information

Academic year: 2023/24
Subject: 30002 - Physics I
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 436 - Bachelor's Degree in Industrial Engineering Technology
ECTS: 6.0
Year: 1
Semester: First semester o Second semester
Subject type: Basic Education
Module:

1. General information

Physics I focuses on the fundamentals of mechanics and its more applied aspects such as mechanical oscillations , elasticity and fluid mechanics. It also provides the basic concepts and principles of thermodynamics, mainly oriented to the study of heat transfer and energy analysis of machines and devices. Since this is a basic training subject, this knowledge is focused as a starting point for other subjects of the Industrial Branch and specific to 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. -Learn the fundamental concepts and laws of Mechanics and Thermodynamics.

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

2. -Correctly apply the essential concepts and equations, the conservation of fundamental mechanical quantities and their time variations to solve basic engineering problems.

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

4. -Perform mass and energy balances correctly in fluid motions in the presence of basic devices and know how to particularize to the hydrostatic case, as well as to know the necessary modifications required for the study of real fluids, in particular the concepts of viscosity and pressure drop.

5. -Correctly use the concepts of temperature and heat and apply them to calorimetric and expansion problems.

6. -Use the fundamental laws and equations of heat transfer by conduction, convection and radiation and apply them to basic engineering problems.

7. -Apply the first and second principles of thermodynamics to processes, basic cycles, heat engine schemes, refrigerators and heat pumps.

8. -Know how to calculate yields and relate the decrease in yields to the irreversibilities of the associated processes.

3. Syllabus

Part I: Mechanics (Fundamentals)

1. Kinematics.

2. Dynamics of a particle.

3. Dynamics of a particle system.

4. The rigid solid.

Part II: Mechanics (Applications)

5. Simple mechanical oscillations.

6. Elasticity.

7. Fluid mechanics.

Part III: Thermodynamics

8. Heat and temperature.

9. First principle of thermodynamics. Processes.

10. Second principle of thermodynamics. Thermal machines.

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 results that define the subject.

Personal study: 69 hours

5. Assessment system

A continuous assessment system, which will be carried out throughout the learning period. The final grade for the subject is calculated as follows:

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.