COURSE DATA

Data Subject	
Code	34915
Name	Physics I
Cycle	Grade
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)			
Degree	**Center**	**Acad. year**	**Period**
1404 - Degree in Industrial Electronic Engineering	School of Engineering	1	First term

Subject-matter		
Degree	**Subject-matter**	**Character**
1404 - Degree in Industrial Electronic Engineering	2 - Physics	Basic Training

Coordination	
Name	**Department**
CERVERA MONTESINOS, JAVIER	345 - Earth Physics and Thermodynamics
HERNANDEZ LUCAS, MARIA JESUS	345 - Earth Physics and Thermodynamics

SUMMARY

Physics I is a first-year (first semester) fundamental course of the Industrial Electronics Engineering Degree. It involves theoretical lectures and problem-solving activities, which are taught at the classroom, and laboratory sessions, which are taught in small groups at the Laboratory of Physics.

An introductory Physics course is present in all scientific and technical degrees. It encompasses a broad margin of subjects that are fundamental in the setting, comprehension and solution of typical engineering problems. Within the first year of the degree it is related to other courses such as Chemistry and Mathematics. In the following years of the degree, Physics I provides basic knowledge for other course such as Energy and Mechanics of Fluids, Electrotechnics, Electronics, and Applied Thermodynamics, among others.

The contents of the course are: **Magnitudes, units and dimensional analysis, error estimation, mechanics, fluids, and thermodynamics**. They are structured in different thematic units as shown in section 6.

The main objective of the course is to provide the student with the basic knowledge of Physics that allows him to understand and explain typical engineering phenomena. This objective can be divided into the following ones:

- The student must acquire a basic terminology in Physics that allows him to express himself with the precision required in the scientific and technical fields, relating concepts and applying them to the study of Electronics Industrial Engineering.
- The student must master the different procedures employed to solve different problems of Physical systems, including the necessary mathematical skills. The student must be able to interpret the solution and discuss its adequacy to the given problem.
- The student must acquire some background knowledge that is necessary for other courses of the degree, whether in the same degree year or in the following ones.
- To acquaint students to the experimental work in Physics, including the design and assembly of experimental set-ups, the taking of measurements, their mathematical treatment, their interpretation in terms of Physical laws and their communication as a scientific report.

Theory lectures will be given in Spanish. Problem solving and laboratory sessions will be given in the language indicated in the subject card, which can be found in the degree's web page.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

It is recommended that the student has taken Chemistry, Physics and Mathematics courses in Secondary School.

OUTCOMES

1404 - Degree in Industrial Electronic Engineering

- CG3 - Knowledge of basic and technological subjects that allows students to learn new methods and theories and provides them with versatility to adapt to new situations.

- CG4 - Ability to solve problems with initiative, decision-making skills, creativity and critical reasoning and to communicate and transmit knowledge, abilities and skills in the field of industrial engineering (with specific industrial electronics technology).
- CG13 - Understanding and mastery of the basic concepts of the general laws of mechanics, thermodynamics, electromagnetics fields and waves, and of their application to solve engineering problems.

LEARNING OUTCOMES

1. Be able to evaluate clearly the orders of magnitude, evaluating the relative importance of the causes that occur in a physical phenomenon (CG3, CG4).
2. Know and comprehend the fundamentals of Physics as well as the mathematical skills needed for its formulation, the involved physical phenomena and its most relevant applications (CG3, CG4, CG13).
3. Capability to solve problems, being able to identify the essential elements and to perform the required approximations (CG3, CG4, CG13).
4. Be able to get deeper knowledge and understanding of the different branches of Physics from the basic concepts acquired in this subject, integrating mathematical formalisms and more complex concepts in the process (CG3, CG4, CG13).
5. Be able to communicate information, ideas, problems and solutions through argumentation and reasoning (CG4).

DESCRIPTION OF CONTENTS

1. Introduction

Introduction to the course. Magnitudes and units. Dimensional analysis. Vectors in R2 and R3.

2. Statics of point particles and rigid bodies

Forces: fundamental interactions and contact forces. The point particle. Equilibrium of point particles. Torque. Rigid bodies. Equilibrium of rigid bodies.

3. Kinematics and dynamics of point particles

Systems of reference. Position, velocity and acceleration. Basic movements. Newton laws. Applications. Work and kinetic energy. Conservative forces and potential energy. Conservation of mechanical energy. [Extension: Collisions and linear momentum conservation.]

4. Kinematics and dynamics of rigid bodies

Circular motion: scalar and vector descriptions. Translation and rotation in a plane. Dynamics of the translation of a system of particles. Fundamental equation of rotation dynamics. Rolling. [Extension: Angular momentum and its conservation. Work and energy in rotation dynamics]

5. Introduction to Fluid Mechanics

Definition of a fluid. Pressure and compressibility. Fluid statics: Fundamental equation and Pascal principle. Buoyancy. Velocity field: Laminar and turbulent flow. Continuity equation. Bernoulli equation. Applications. [Extension: Surface effects. Viscosity.]

6. Thermodynamics

Thermodynamic system. Thermodynamic interactions in a simple system. Variables and equations of state. Temperature: Zeroth principle and empirical temperature. Systems in thermodynamic equilibrium: Compressibility and expansion, thermal equation of an ideal gas. Thermodynamic processes: Work and heat. First and second law of Thermodynamics. Heat engines. [Extension: Entropy]

7. Introduction to Physics Laboratory

Errors as uncertainties. How to report a measurement. Estimation of uncertainties: direct measurements and propagation of uncertainties. Interpolation. Least-squares fitting.

WORKLOAD

ACTIVITY	Hours	% To be attended
Classroom practices	25,00	100
Theory classes	25,00	100
Laboratory practices	10,00	100
Development of group work	10,00	0
Development of individual work	10,00	0
Study and independent work	10,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	20,00	0
Preparation of practical classes and problem	20,00	0
Resolution of case studies	10,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The course is composed of two clearly differentiated parts:

- Theory and problems (classroom)
- Experimental work (laboratory)

In each part a different instruction method is followed.

Theory and problems:

There are on average four hours per week of classroom sessions that are equally divided between theoretical lectures and problem-solving sessions.

In theoretical lectures, the main concepts of the course will be introduced. Stress will be put on the practical applications of these concepts and some illustrative examples will be given. The participation of the students will be encouraged (CG3, CG13).

A collection of problems will be given to the students. Some of these problems will be solved during the problem-solving sessions. A series of problems will be assigned individually for the students to solve them at the end of each block or unit (CG3, CG4, CG13). These problems will be evaluated to assess the progress of the students.

Experimental work:

The experimental part of the course consists in four laboratory sessions, where the students will be divided into small groups (up to 16 students). The first session is devoted to the analysis of experimental data (uncertainties, graphics, fitting). In the following sessions, students will work, in pairs, in the laboratory. They will set up the experiment and make the measurements. After every session, every pair of students will write a report on the experiment, showing the experimental data and their analysis (uncertainties, graphs, fitting) as well as the conclusions derived from them (CG3, CG4, CG13).

EVALUATION

Course evaluation is made considering its differentiated parts:

1. Theory and problems
2. Experimental work

The evaluation of each part is done separately according to the criteria shown below.

a) Evaluation of theory and problems

The evaluation of this part includes:

1. The evaluation of the problems proposed to the student during the course (CG3, CG4, CG13).
2. A final exam at the end of the term (CG3, CG4, CG13). The exam will consist in a number of theoretical-practical questions.

If the mark obtained in the exam is below 40% of the maximum mark, it will be considered that the student has failed the course.

b) Evaluation of experimental work

Experimental work is evaluated through the reports the students have written after every laboratory session (except for the first one, three in total) (CG3, CG4, CG13). The first session will be evaluated through the reports of the other three sessions. It is compulsory to attend the experimental sessions (compulsory and non-recoverable activity).

If the mark obtained in the laboratory part is lower than 50% of the maximum mark, it will be considered that the student has failed the course.

FINAL MARK

The final mark on the course is obtained from the maximum between:

1. The average between the mark obtained in the proposed problems (25%), the mark obtained in the final exam at the end of the term (50%, , compulsory and non-recoverable activity, if the mark of this part is below 40% of the maximum mark, the student will have failed the course) and the average mark obtained in the laboratory reports (25%, compulsory and non-recoverable activity, if the average mark of this part is below 50% of the maximum mark, the student will have failed the course).
2. The average between the mark obtained in the exam at the end of the term (75%, , compulsory and non-recoverable activity, if the mark of this part is below 40% of the maximum mark, the student will have failed the course) and the average mark obtained in the laboratory reports (25%, compulsory and non-recoverable activity, if the average mark of this part is below 50% of the maximum mark, the student will have failed the course).

In any case, the evaluation system is being dictated by the rules compiled at the Evaluation and Qualifying Rules of the Universitat de València for Degrees and Masters (https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?accion=inicio&idEdictoSeleccionado=5639).

REFERENCES

Basic

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Additional

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