COURSE DATA

DATA SUBJECT

Code: 34915
Name: Physics I
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1404 - Degree in Industrial Electronic Engineering	Escola Tècnica Superior d'Enginyeria	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1404 - Degree in Industrial Electronic Engineering	Physics	BASIC

COORDINATION

CAMPOS TABERNER MANUEL

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.

COMPETENCES / LEARNING OUTCOMES

1404 - Degree in Industrial Electronic Engineering

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.

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).

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]

Errors as uncertainties. How to report a measurement. Estimation of uncertainties: direct measurements

7. Introduction to Physics Laboratory

and propagation of uncertainties. Interpolation. Least-squares fitting.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	25,00
Laboratory	10,00
Classroom practices	25,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	20,00
Independent study and work	10,00
Preparation of lessons	40,00
Preparation for assessment activities	10,00
Resolution of case studies	10,00
Total hours	**90,00**

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

The evaluation of the course is made considering the different parts it contains:

a) Theory and problems

b) Laboratory

The evaluation of each part is done separately, with the criteria detailed below.

a) Evaluation of theory and problems:

The evaluation of this part includes:

1. The completion of a series of problems proposed throughout the course (CG3, CG4, CG13).

2. The realization of a final exam where the whole course will be evaluated. The exam will consist of

several theoretical-practical questions (CG3, CG4, CG13).

In order to average the grades of the problems and assignments (continuous evaluation) to pass the course, it is necessary that the score of the final exam is not less than 40% of the maximum grade.

b) Laboratory evaluation:

The laboratory work is evaluated on the basis of the reports made by the students for each of the practical sessions (3 in total) foreseen during the course (CG3, CG4, CG13). The first session (errors) is evaluated on the basis of the reports of the three practicals. Attendance to the sessions is compulsory (compulsory activity not recoverable).

In order to meet the grade of the theoretical part and problems that allows passing the course, it is necessary that the laboratory grade is not less than 50% of the maximum grade.

FINAL SCORE

The final score will be obtained as the higher of:

1. - The weighted average of the score of the proposed problems (25%), of the exam score (50%, compulsory and non-recoverable activity to pass the course; if the exam score is lower than 40% of the maximum score of each part, the course is considered failed) and of the score of the work undertaken in the laboratory (25%, compulsory and non-recoverable activity to pass the course; if the laboratory score is lower than 50% of the maximum score of each part, the course is considered failed).

2. - The weighted average of the exam score (75%, obligatory and non-recoverable activity to pass the course; if the exam score is lower than 40% of the maximum score of each part, the course is considered failed) and the laboratory work score (25%, obligatory and non-recoverable activity to pass the course; if the laboratory score is lower than 50% of the maximum score of each part, the subject is considered failed).

In any case, the evaluation system will be governed by the provisions of the Regulation of Evaluation and Grading of the University of Valencia for Degrees and Masters:

https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?accion=inicio&idEdictoSeleccionado=5639

Copying or plagiarism of any activity , which is part of the evaluation will make it impossible to pass the course, and the appropriate disciplinary procedures indicated in the PROTOCOL OF ACTION AGAINST FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020) must be followed.

REFERENCES

- Tipler P. A.; Mosca G., Física per a la ciència i la tecnologia. Volum 1, Ed. Reverté, 2021 (libro en formato electrónico para miembros de la UV)
- Squires G. L. Practical Physics. Cambridge University Press. 2012 (libro en formato electrónico para miembros de la UV)
- Hibbeler R. C., Estática. 12ª edición. Editorial Prentice Hall, 2016 (libro en formato electrónico para miembros de la UV)
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- Emri I.; Voloshin A. Statics: Learning from engineering examples. Springer. 2016 (libro en formato electrónico para miembros de la UV)
- Radi H. A.; Rasmussen J. O. Principles of physics for scientists and engineers. Springer. 2013 (libro en formato electrónico para miembros de la UV)