Universidad Zaragoza

Academic Year/course: 2022/23

39601 - Basic physics I

Syllabus Information

Academic Year: 2022/23
Subject: 39601 - Basic physics I
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 608 -
ECTS: 6.0
Year: 1
Semester: First semester
Subject Type: Basic Education
Module:

1. General information

1.1. Aims of the course

The subject and its expected results respond to the following approaches and objectives:

- Understand the fundamental concepts and laws of mechanics and thermodynamics and their application to basic problems in engineering.
- Analyze problems that integrate different aspects of physics, recognizing the various physical fundamentals that underlie a technical application, device or real system.
- Understand the units and orders of magnitude of the defined physical quantities and solve basic engineering problems, expressing the numerical result in the appropriate physical units.
- Correctly use basic methods of experimental measurement and treat, present and interpret the data obtained, relating them to the appropriate magnitudes and physical laws.
- Use bibliography and use clear and precise language to express physics issues.
- Correctly apply the fundamental equations of mechanics to various fields of physics and engineering Understand the meaning, utility and relationships between magnitudes.
- Correctly use the concepts of temperature and heat. Apply them to calorimetric, expansion and heat transfer problems.
- Know the first and second principles of thermodynamics.
- Use of different software tools to process physical data.
- Expose the universal nature of physical laws, their inexorable character and the enormous benefits that are obtained from their knowledge in the field of engineering.
- Use various software tools to analyze and present results.

The following SDGs will be worked on during the next academic year:

-Goal 7: Affordable and Clean Energy.

-Goal 8: Sustainable Cities and Communities.

1.2. Context and importance of this course in the degree

Physics I is a basic training subject, with 6 ECTS credits this subject is taught during the first year of the program in Mechatronic and Industrial Organization Engineering.

It aims to provide the student with the basic knowledge of the most relevant phenomena and physical laws of application in the study of engineering; as well as the necessary tools to apply this theoretical knowledge to the resolution of engineering problems. More specifically, it focuses on the study of mechanics and thermodynamics.

1.3. Recommendations to take this course

Basic Physics I is a basic subject that must provide a first contact with the foundations, methods and scientific procedures of Physics. A close relationship is established with other analogous subjects such as physics II, Mathematics I, II, III inserted within the degree itself.

In order to face the subject with guarantees, it is recommended to have completed physics and mathematics in the second year of high school or equivalent.

2. Learning goals

2.1. Competences

Upon passing the subject, the student will be more competent to:

- Generic competence:
  - **GI04:** Ability to solve problems with initiative, decision making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Mechatronic Engineering and in particular in the field of industrial electronics.
  - **GC11:** Ability to communicate their reasoning and designs clearly to specialized and non-specialized audiences.
- Specific competence:
  - **C13:** Understanding and command of the basic concepts of the general laws of mechanics, fields and waves and electromagnetism and their application to solve engineering problems.

2.2. Learning goals

Once the subject is passed, the student will be able to:

- Know the fundamental concepts and laws of mechanics, thermodynamics, fields, waves and electromagnetism and their application to basic problems in engineering.
- Analyze problems that integrate different aspects of physics, recognizing the various physical foundations that underlie a technical application, device or real system.
- Know the units, orders of magnitude of the defined physical magnitudes and solve basic engineering problems, expressing the numerical result in the appropriate physical units.
- Correct use of basic methods of experimental measurement or simulation and treat, present and interpret the data obtained, relating them to the appropriate magnitudes and physical laws.
- Use of bibliography, by any of the currently available means and use of clear and precise language in explanations on physic issues.
- Applies the fundamental equations of mechanics to various fields of physics and engineering: rigid solid dynamics, oscillations, elasticity, fluids, electromagnetism and waves.
- Understands the meaning, usefulness and relationships between magnitudes, modules and fundamental elastic coefficients used in solids and fluids.
- Perform mass and energy balances correctly in fluid movements in the presence of basic devices.
- Correct use of the concepts of temperature and heat. He applies them to calorimetric, expansion, and heat transfer problems.
- Apply the first and second laws of thermodynamics to processes, basic cycles, and heat engines.

2.3. Importance of learning goals

The activities carried out in this subject are of high formative content since they encourage the development of the reasoning, analysis and synthesis skills, problem-solving and application cases and initiation to laboratory work and to the application of the scientific method.

Due to its condition as a basic training subject, the competence acquired corresponds to what is required in every degree in the fields of Engineering and Architecture.

Being a subject taught during the first course, on the one hand, it should serve to strengthen and homogenize the knowledge acquired in previous educational stages and, on the other hand, act as a foundation to build on it the most specific technical knowledge that will be addressed in other subjects of the degree. In particular, all those that are related to mechanics, thermodynamics, elasticity and fluid mechanics.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The student must demonstrate that they have achieved the expected learning outcomes through the following assessment activities.

There is the possibility of passing the subject through two different routes:

Continuous assessment:

Following the spirit of Bologna, regarding the degree of involvement and continued work of the student throughout the course, the evaluation of the subject considers the continuous evaluation system as the most consistent to be in line with the guidelines set by the new framework. from the EHEA.

To opt for the Continuous Assessment system, you must attend at least 80% of the face-to-face classes. It will consist of:

- **Written Tests:** two partial written tests will be carried out whose grade (NE) will be the average of all of them. To pass this part, it is required to obtain a grade greater than or equal to 4.0 in each partial exam. In addition, NE must be greater than or equal to 5.0. The weight of this mark in the final evaluation of the course will be 80%.
- **Laboratory practices:** up to 4 laboratory practices will be carried out. They are compulsory face-to-face activities that the student must have carried out to pass the subject and a report on the activity carried out must be prepared. To pass this part, the Practices grade (NP) must be greater than or equal to 5.0. The weight of this mark in the final evaluation of the subject will be 20%.

The final grade for the course will be: **NF = 0.80 NE + 0.20 NP**

To pass the course, the student must obtain an NF grade greater than or equal to 5.0.

Global Assessment

The Global Assessment will consist of:

- **A Written exam:** there will be a final written exam whose grade must be greater than or equal to 5.0 to pass the course.

In the two global evaluation calls the same evaluation procedure will be followed.

Note: in case the students do not pass the subject through Continuous Assessment, they can do so through Global Assessment. In addition, in the event that the students have passed the subject through Continuous Assessment and want to improve their grade, they may carry on the global exam at 1st call of the Global Assessment without risk of lowering their grade.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The learning process that is designed for this subject is based on the following:

The course consists of 6 ECTS credits, which represents 150 hours of student work on the subject during the semester. 40% of this work (60 h.) Will take place in the classroom, and the rest will be autonomous. One semester consists of 15 teaching weeks. To make the timing is used to measure the school week, in which the student must devote to the study of the subject 10 hours.

The approach, methodology and assessment of this guide are intended to be the same for any teaching scenarios. They will be adapted to the social-health situation at any particular time, as well as to the instructions given by the authorities concerned.

4.2. Learning tasks

The course includes the following learning tasks:

- Lectures: theoretical activities so fundamentally expository given by the teacher.
- Practice Sessions: practical discussion activities and conducting exercises conducted in the classroom and requiring high student participation.
- Laboratory Practice: Practical activities in laboratories.
- Group tutorials.
- individual tutoring.

4.3. Syllabus

The course will address the following topics:

- I. Kinematics
- II. Dynamics of one and several particles. Static.
- III. Rigid body dynamics

- IV. oscillatory movement
- V. Elasticity and fluids
- VI. Thermodynamics

4.4. Course planning and calendar

Planning for weeks about the subject is as follows:

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Topic	I	I	II	II	III	III	III/IV	IV	IV	V	V	VI	VI	VI	R
Exams							1º							2º	

The dates for the continuous assesment tasks will be available at the moodle platform.
The dates for the global assesment will be available at https://eupla.unizar.es/asuntos-academicos/examenes

4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=39601