

28901 - Physics I

Syllabus Information

Academic year: 2023/24

Subject: 28901 - Physics I

Faculty / School: 201 - Escuela Politécnica Superior

Degree: 583 - Degree in Rural and Agri-Food Engineering

ECTS: 6.0

Year: 1

Semester: First semester

Subject type: Basic Education

Module:

1. General information

The aim of this subject is to provide scientific explanations to the physical phenomena directly related to agri-food and rural engineering.

We will be interested in answers to questions such as:

why does an embedded beam remain in equilibrium?

what do articulated structures for bridges, cranes, electric poles, canopies have in common?

why does the pressure in the constrictions of a pipeline decrease?

The subject of Physics I is indirectly related to the following SDGs:

Goal 6: Ensure the Availability and Sustainable Management of Water and Sanitation for All.

Goal 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation.

This subject is continued in the second semester, in the subject "*Physics II*", which completes the basic foundation of the subject.

2. Learning results

To pass the subject, the student must demonstrate that they have acquired the following learning results:

-Enunciate, synthesize, analyze, relate and apply the basic principles and fundamentals of General Mechanics (Statics and Dynamics) and Applied Mechanics (Elasticity and Fluid Mechanics).

-To relate dimensionally the different physical magnitudes and to use correctly the coherent systems of units, especially the International System, within the scope of the subject.

-To interpret quantitatively and qualitatively the results obtained in the satisfactory resolution of certain cases based on physical phenomena and processes, both general and related to the agri-food and rural environment.

-Express adequately in oral and written form, both in substance and form, clarity and organization in the methods, processes, results obtained and their analysis in the cases entrusted for study.

-To elaborate laboratory works and reports making an adequate use of ICT (word processor, spreadsheet, bibliographic searches on the Internet) in relation to the phenomena described above.

-Execute the laboratory work assigned in which they demonstrate that they are able to make an adequate use of the basic instrumentation in Physics.

-Relate certain practical cases, within the scope of the subject, to environmental sustainability and contextualize them appropriately in the framework of the SDGs of the 2030 Agenda.

3. Syllabus

BLOCK I. STATICS

Topic I.1. Introduction to vector calculus

Topic I.2. Introduction to mechanics

Topic I.3. Particle statics. Equilibrium of the rigid solid.

Topic I.4. Distributed forces: centers of gravity and moments of inertia of areas.

Topic I.5. Structural analysis.

Topic I.6. Dry rubbing.

BLOCK II. DYNAMICS

Topic II.1. Particle kinematics.

Topic II.2. Particle kinetics. Energy and momentum method.

Topic II.3. Rotational dynamics of the rigid solid.

BLOCK III. SOLID AND FLUID MECHANICS

Topic III.1. Elasticity.

Topic III.2. Fluid statics.

Topic III.3. Fluid dynamics.

LABORATORY PRACTICE PROGRAM

Practice 1.- Statics

Practice 2.- Fluid mechanics

Practice 3.- Elasticity: Hooke's Law and Young's Modulus

Measurement of densities and viscosities

Practice 5.- Physical properties of liquids

4. Academic activities

Lectures: 46 hours

Theoretical-practical sessions in which the contents of the subject will be explained and problems will be solved.

Laboratory practices: 10 hours

Practical sessions in the laboratory.

Preparation and presentation of problems to the teacher: 3 hours

Estimated time that the student will dedicate to solve a problem proposed by the teacher and its subsequent presentation.

Assessment tests. 6 hours

Personal study: 85 hours

Estimated time that the student should dedicate to the study and preparation of the subject (including the attendance to the tutorials with the teacher).

5. Assessment system

Assessment activity 1 Written classroom exam (75% of the overall grade)

It will consist of two tests, corresponding to the thematic blocks detailed below:

- Test 1a. Block I. Statics (37.5% of the overall grade)
- Exhibit 1b. Block II. Dynamics and Block III. Solid and Fluid Mechanics (37.5% of the overall grade)

It will be favorably evaluated:

- Understanding of physical laws, theories and concepts.
- Dexterity and skill in the use of mathematical tools.
- The correct use of units in physical quantities.
- Clarity in diagrams, figures and graphic representations.
- The correctness of the results, as well as the order, presentation and physical interpretation of the results.

If the student obtains in Test 1a a grade higher or equal to 4, they will not have to take this part in the final exam (unless they wish to improve the grade obtained, in which case the highest grade obtained will be taken into account).

On the other hand, if the grade in any of the Tests (1a or 1b) is lower than 4, the subject will not be considered passed, regardless of the grades obtained in the rest of the activities that are evaluated.

Assessment activity 2 Individual resolution and oral defense of a case study (10% of the overall grade) Throughout the semester and at the student's request, an individual assignment will be carried out consisting of the resolution of a case study, outside the classroom, and the oral presentation of the methodology, the process, the results and their physical interpretation, in a pre-arranged tutorial session.

Assessment activity 3 Laboratory practicals (15% of the overall grade)

In the global assessment of the laboratory practices, the grade obtained will depend on:

- The grade obtained in the test questionnaires answered before the beginning of each practice.
- The coherence and analysis of the results obtained in the different sections of each practice.
- The quality of the reports delivered.
- The active participation and interest shown by the group members during the development of each session.

ATTENTION: The assessment activities 1a, 2 and 3 can be carried out, and it is recommended, throughout the term in the dates indicated in the temporary planning of the subject, or in the official call at the end of the semester. If students have not

taken or has not passed any of them during the term, they must take them on the date of the globaltest.

Subject success rate for the last three years: 2019-2020: 34,09%; 2020-2021: 64,81%; 2021-2022: 65,71%