

28901 - Physics I

Syllabus Information

Academic year: 2024/25

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 teaching of this subject will provide scientific explanations to physical phenomena directly related to Agri-food and Rural Engineering, especially those corresponding to the fields of Statics, Dynamics and Mechanics applied to the elasticity of materials and fluids. In order to adequately follow this subject, it is highly recommended to have taken the Physics and Mathematics subjects of the last year of High School Bachelor. On the other hand, during the semester it is essential to study and work continuously, as well as the good use of the material provided by the teacher and the recommended bibliography.

This subject has its direct continuation in the subject Physics II, in the second semester, which completes the basic fundamentals of the subject. Likewise, it will establish the necessary bases to be able to take subjects in later courses, such as Resistance of Materials and Calculation of Structures or Hydraulics.

This subject is aligned with the Sustainable Development Goal (SDG) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), so that the acquisition of the learning results of the subject contributes to some extent to its achievement: 6, 9, 14.

2. Learning results

The student must demonstrate the following learning results to pass the course:

1. Enunciates, synthesizes, analyzes, relates and applies the basic principles and fundamentals of General Mechanics (Statics and Dynamics) and Applied Mechanics (Elasticity and Fluid Mechanics).
2. Relates dimensionally the different physical magnitudes and uses correctly the systems of units, especially the International System, within the scope of the subject.
3. Interprets quantitatively and qualitatively the results obtained in the resolution of cases based on physical phenomena and processes, both general and related to the agri-food and rural environment fields.
4. Expresses adequately in oral and written form, both in substance and form, clarity and organization, the methods, processes and results obtained and their analysis in the case entrusted for study.
5. Elaborates laboratory works and reports making an adequate use of ICT (word processor, spreadsheet, bibliographic searches) in relation to the phenomena described above.
6. Executes the laboratory work assigned, demonstrating that he/she is able to make an adequate use of the basic instrumentation in Physics.

3. Syllabus

BLOCK I. STATICS

Topic I.1. Introduction to vector calculus.

Topic I.2. Introduction to mechanics.

Topic I.3. Equilibrium of the particle and the rigid solid.

Topic I.4. Rubbing force.

Topic I.5. Distributed forces: center of gravity and moment of inertia.

Topic I.6. Structural analysis.

BLOCK II. DYNAMICS

Topic II.1. Particle kinematics.

Topic II.2. Particle dynamics: forces and energies.

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

BLOCK III. MECHANICS OF SOLIDS AND FLUIDS

Topic III.1. Elasticity.

Topic III.2. Fluid statics.

Topic III.3. Fluid dynamics.

4. Academic activities

Participative lectures: 46 hours. Theoretical-practical sessions in which the contents of the course will be explained and proposed problems will be solved.

Laboratory or computerized practices: 12 hours. Five laboratory practical sessions and one computer practical session.

Work and presentation of a practical case: 2 hours. Resolution and later exposition and oral defense by the student of an exercise proposed by the teacher.

Individual and group independent study and work: 84 hours. It includes the study and personal preparation of the theory and problems of the subject, the elaboration of practice reports, the preparation of the exposition work and, if necessary, the attendance to tutorials with the teacher.

Assessment tests: 6 hours

5. Assessment system

The course will be evaluated in global evaluation mode, with intermediate evaluation activities. The evaluation is divided into three parts:

1. Written exams: 70% of the final grade.

- Partial A (PA) (35% of the final grade). Written test on the theoretical-practical contents of Block I: Statics. It will take place during the teaching period at the end of the syllabus corresponding to this block. If the student obtains a grade $\geq 4.5/10$ in this test, he/she will not be obliged to take this part in the official exam, unless he/she wishes to improve his/her grade.
- Partial B (PB) (35% of the final grade). Written test on the theoretical-practical contents of the second part of the course, separated during the four-month period into:
 - PB.1 (21% of the final grade): Block II: Dynamics. It will be carried out during the academic period at the end of the syllabus corresponding to this block. If the student obtains a grade $\geq 4.5/10$ in this test, he/she will not be obliged to take this part in the official exam.
 - PB.2 (14% of the final grade): Block III: Mechanics of solids and fluids. It will be taken on the date of the official convocation.

The grade of PB will be obtained from the weighted sum of both PB.1 and PB.2 in the case that the previous conditions are fulfilled. If the student had to take both tests PB.1 and PB.2 on the date of the official convocation, or would like to do so in order to improve the grade obtained in PB.1, these will form a unique test, PB.

If the grade in any of the partial tests PA or PB is $< 4.5/10$, the course will not be considered passed, regardless of the grades obtained in the rest of the activities that are evaluated. If the student has not taken or has not passed any of them during the semester, he/she will be able to take them on the date of the official exam.

In any case, if the student wishes, on the date of the official exam, he/she may choose to take a single test with contents of the three blocks of the subject. In order to pass the course in this way, the grade of this test must be $\geq 4.5/10$.

In these tests will be evaluated favorably:

- The understanding of the laws, theories and physical concepts.
- The dexterity and ability in the handling of mathematical tools.
- The correct use of units in physical magnitudes.
- Clarity in schemes, figures and graphic representations.
- The correctness of the results, as well as their order, presentation and physical interpretation.

2. Laboratory or computerized practices (PL): 20% of the final grade.

In order to pass this part during the semester period, it is mandatory to attend all the practicals, as well as to obtain a grade $\geq 5/10$. The evaluation of the laboratory practicals will depend on:

- The grade obtained in the test-type questionnaires prior to the beginning of each practical.
- The coherence and analysis of the results obtained in the different sections of each practical.
- The quality of the reports submitted.
- The active participation and interest shown by the members of the group during each session.

If more than 50% of the laboratory practice reports submitted have an individual grade $< 5/10$, this part will be considered as not passed.

In case of not passing the above conditions, the student will have to take a practical exam on the date of the official convocation.

3. Resolution and oral presentation of a case study (CP): 10% of the final grade.

Throughout the semester, and at the student's request, an assignment consisting of the resolution of a practical case, outside the classroom, and the oral presentation of the methodology, the process, the results and their physical interpretation, will be carried out in a previously arranged tutoring session. This assignment will be done preferably in pairs or trios of students.

The evaluation activities PL and CP can be carried out, and it is recommended, throughout the term on the dates indicated in the temporary planning of the subject. If a student has not taken or has not passed any of them during the course, he/she must take them on the date of the official call.

The final grade of the course will be calculated considering the specific weight of each evaluation activities. The subject will be passed if the final grade is ≥ 5.0 , provided that the minimum conditions indicated in the different parts are met. If the final grade of this calculation is ≥ 5.0 , but any of these conditions is not met, the subject will be failed with a 4.9 as the final grade.

The detailed definition of the evaluation system will be explained in the presentation of the course.

Subject success rate for the last three years: 2020-2021: 64,81%; 2021-2022: 65,71%; 2022-2023: 44,26%.

6. Sustainable Development Goals

6 - Clean Water and Sanitation
9 - Industry, Innovation and Infrastructure
14 - Life Below Water