

27055 - Physics I

Syllabus Information

Academic year: 2024/25

Subject: 27055 - Physics I

Faculty / School: 100 - Facultad de Ciencias

Degree: 647 - Degree in Mathematics

ECTS: 6.0

Year: 1

Semester: First semester

Subject type: Basic Education

Module:

1. General information

Physics I is a core subject within the degree program. Physics exemplifies the capabilities of mathematics to formalize natural phenomena, propose explanations, and enable the prediction of new phenomena. Mathematics has found material for its own development in the problems of physics. On the other hand, the increasing importance of mathematics as an applied science makes physics a source of inspiration and a challenge for mathematical thinking.

One of the objectives of this subject is to develop and expand concepts with which students are already familiar, such as kinematics and dynamics of a particle, Newton's laws, and concepts like work and mechanical energy. Additionally, topics that may be new to students or at least not deeply covered, such as the dynamics and equilibrium of rigid bodies and particle systems, are introduced.

Physics I is one of the subjects in the physics module, and aside from its basic nature, it presents content that will be directly relevant to students planning to take courses in the astrodynamics module.

Attendance and active participation of students in classes, as well as in other academic teaching activities—problem-solving, laboratory work, consultations with the teacher during tutoring hours, etc.—are recommended."

2. Learning results

- Calculate the trajectory of a particle given the responsible forces and the initial conditions of the motion.
- Solve problems of particle collisions using conservation theorems.
- Recognize and solve problems of simple harmonic motion (SHM).
- Recognize and solve problems of damped and forced oscillations.
- Solve problems involving multiple bodies (systems of particles). Calculation of centers of mass.
- Analyze the rotation of a rigid body around an axis. Calculation of moments of inertia.
- Solve problems involving the equilibrium of a rigid body.
- Solve simple gravitation problems and those involving continuous mass distributions.

3. Syllabus

1. Kinematics of a particle.
2. Dynamics of a particle. Newton's laws. Forces and moments. Work and mechanical energy.
3. Simple harmonic motion. Damped oscillations. Forced oscillations.
4. Dynamics of particle systems. Center of mass. Conservation laws. Collisions.
5. Dynamics and equilibrium of rigid bodies.
6. Gravitation.

4. Academic activities

Master classes: 42 hours.

Problem solving: 13 hours.

Laboratory: 5 hours.

Study: 83 hours.
Assessment tests: 7 hours.

5. Assessment system

- There will be a written exam consisting of:
 - Problem solving exam (from 65% to 75% of the final grade).
 - Theory exam (from 25% to 35% of the final grade).
- Evaluation of the lab activity and lab questionnaires. Weight 10% of the total grade. There will be lab exam for those students who do not attend the lab.
- Evaluation made along the academic course (class attendance and participation). Among the optional activities that can be evaluated are: preparing an essay on a selected topic from those suggested by the profesor and its oral presentation, individually o in small groups. Solving suggested problems that the students hand in. If that is the case there will be an evaluation of the essay, oral presentation and handed problems respectively. The weight of these activities in the final grade is 10%. In order for this grade to be computed, the student must achieve a minimum grade of 4 out of 10 in the rest of the evaluation activities.

Without limiting the right that the student has, according to the current regulations, to assist and, if applicable, pass the subject by taking a global examination.

6. Sustainable Development Goals

- 4 - Quality Education
- 5 - Gender Equality
- 8 - Decent Work and Economic Growth