Universidad Zaragoza

Academic Year: 2025/26

28601 - Physics I: general mecanichs

Teaching Plan Information

Academic year: 2025/26
Subject: 28601 - Physics I: general mecanichs
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 422 - Bachelor's Degree in Building Engineering
ECTS: 6.0
Year: 1
Semester: First semester
Subject type: Basic Education
Module: Materia básica de grado

1. General information

This subject aims to provide students with the tools and concepts of Physics necessary to address any type of problem or situation related to Engineering and Architecture and applications in it, such as analysis of structures and stability, among others, considering the influence of different types of physical quantities that affect the structures both in their static and dynamic state, while increasing their capacity for logical friction, deductive and inductive. Here they will become proficient in the everyday use of the units of measurement of the International System and the English System and will learn to solve all kinds of situations in Mechanics, Fluids, Waves and Thermodynamics that can be applied to the real world. They will also learn to interpret scientific results and data analysis obtained in the laboratory from practices related to the topics studied and oriented to the students' grade level.

In order to take this subject successfully and profitably, it is recommended that students have previous knowledge of General Physics and Mathematics corresponding to the curriculum developed in the Baccalaureate. In general terms, requires knowledge of Algebra, Vectors, Derivatives and Integrals of functions in Mathematics, as well as the handling of physical concepts related to Kinematics of a particle, Dynamics, Statics, Hydrostatics, Thermodynamics, Waves and Acoustics in Physics.

2. Learning results

- Identify physical quantities from given units of measurement.
- Recognize the properties of scalar and vector magnitudes.
- Solve practical questions of kinematics, dynamics and fluids, using the notions of Differential Calculus and Integral.
- Recognize the forces involved in static and dynamic systems and their effects.
- Identify which of the quantities studied in class are conserved in different systems.
- To formulate equations of forces and moments in statics exercises.
- Solve problems of rotation of rigid solids about an axis and a point.
- Solve practical wave exercises using the notions studied in the theoretical classes.
- Recognize the different types of wave phenomena.
- Use the first principle of thermodynamics to solve calorimetry exercises.
- Describe thermodynamic processes in ideal gases and understand simple thermodynamic cycles.
- Master the fundamental quantities used to describe a system in fluid mechanics.
- Take experimental measurements in the laboratory to later analyze the results and discuss them in an adequate way, both orally and in writing, justifying the results obtained.

3. Syllabus

1. Units of measurement and vectors.
2. Kinematics: concepts of displacement, distance traveled, velocity and acceleration.
3. Kinematics of rectilinear, curvilinear, circular, and harmonic motion.
4. Dynamics: Newton's laws, forces in nature, work, power and energy. Stokes' Law.
5. Particle systems. Laws of conservation of mechanical energy and linear momentum.
6. Rigid solid dynamics: the rigid solid, rotation, conservation of angular momentum, mass moments of inertia, kinetic energy of rotation.
7. Statics of particles and extended bodies: conditions for static equilibrium of particles and extended bodies.
8. Fluid statics and dynamics: pressure, Pascal's and Archimedes' principles. Continuity and Bernouilli equations. Venturi effect. Viscous Fluids. Reynolds number.
9. Oscillatory motion: simple harmonic motion (MAS) and forced.
10. Universal Gravitation.
11. Waves and wave phenomena.

12. Acoustics and Resonance.
13. Thermodynamics. Thermal equilibrium. Ideal gases.
14. First Principle of Thermodynamics. Thermodynamic processes.
15. Thermal machines and second principle of Thermodynamics.

4. Academic activities

- **Expository master classes (3 ECTS: 30 h)**:Theoretical and/or practical activities given by the teacher in a fundamentally expository way.
- **Classroom practices/seminars/workshops (2 ECTS: 20 h)**: Theoretical discussion or preferably practice activities carried out in the classroom and requiring a high level of student participation.
- **Laboratory practices (1 ECTS: 10 h)**: Practical activities carried out in the laboratories.
- **Group tutoring**: Programmed learning follow-up activities, in which the teacher meets with a group of students to guide their study work, autonomous learning and tutoring of directed work, or other proposed activities that require a very high degree of advice from the teacher.
- **Individual tutoring**.
- **Continuous Assessment Exams (6 h)**: written test of the subject of 01:50 h of duration.

5. Assessment system

The course will be assessed by the **Continuous** and **Global** Assessment methods.

The **Continuous Assessment** method will be composed of 3 midterm exams, written tests, each of them composed of 5 thematic units of content. The final grade obtained here will be calculated as the average of the 3 midterm exams taken. In order to pass the subject by continuous assessment, students must obtain an average of 5.0 or higher in the midterm exams and have completed all the laboratory practicals and submitted all their corresponding practical reports. Students who have not passed the course by Continuous Assessment must take the Final Examination in force.

The **Global Assessment** method will be composed by the Final Examination of Call which involves all the thematic units studied within the content of the subject. This test has a weight of 100%. The final grade to pass the subject is 5.0 or higher.

The final grade of 5.0 or higher, obtained by the Continuous or Global Assessment Method, will be weighted 70% together with the sum of 30% of the Laboratory Practicals grade, the final result representing the grade of the subject that will appear in the Proceedings.

6. Sustainable Development Goals

5 - Gender Equality
9 - Industry, Innovation and Infrastructure