28703 - General physics

Información del Plan Docente

Academic Year	2017/18
Faculty / School	175 - Escuela Universitaria Politécnica de La Almunia
Degree	423 - Bachelor's Degree in Civil Engineering
ECTS	6.0
Year	1
Semester	First semester
Subject Type	Basic Education
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

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

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

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

Strong interaction between the teacher and the student. This interaction is brought into being through a division of work and responsibilities between the students and the teacher. Nevertheless, it must be taken into account that, to a certain degree, students can set their learning pace based on their own needs and availability, following the guidelines set by the teacher.

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The current subject "Física general" is conceived as a stand-alone combination of contents, yet organized into three fundamental and complementary forms, which are: the theoretical concepts of each teaching unit, the solving of problems or resolution of questions and laboratory work, at the same time supported by other activities.

The organization of teaching will be carried out using the following steps:

- **Theory Classes** : Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them in topics and or sections, interrelating them.
- **Practical Classes** : The teacher solves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.
- **Laboratory Workshop** : The lecture group is divided up into various groups, according to the number of registered students, but never with more than 20 students, in order to make up smaller sized groups.
- **Individual Tutorials** : Those carried out giving individual, personalized attention with a teacher from the department. These tutorials may be in person or online.

Regarding to the slides, proposed exercise photocopies, laboratory session guides and other materials used in class, all of them are going to be available on the Moodle platforma of this subject.

Material	**Format**
Topic theory notes	Paper/repository
Topic problems	
Topic theory notes	Digital/Moodle
Topic presentations	
Topic problems	
Related links	E-mail
Educational software	Open source Maxima and Octave

5.2.Learning tasks

The programme offered to the student to help them achieve their target results is made up of the following activities:

It involves the active participation of the student, in a way that the results achieved in the learning process are developed, not taking away from those already set out; the activities are the following:

Face-to-face generic activities :

- **Theory Classes** : The theoretical concepts of the subject are explained and illustrative examples are developed as support to the theory when necessary.
- **Practical Classes** : Problems and practical cases are carried out, complementary to the theoretical concepts studied.
- **Laboratory Workshop** : This work is tutored by a teacher, in groups of no more than 20 students.

Generic non-class activities :

- Study and understanding of the theory taught in the lectures.
- Understanding and assimilation of the problems and practical cases solved in the practical classes.
- Preparation of seminars, solutions to proposed problems, etc.
- Preparation of laboratory workshops, preparation of summaries and reports.

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- Preparation of the written tests for continuous assessment and final exams.

The subject has 6 ECTS credits, which represents 150 hours of student work in the subject during the semester, in other words, 10 hours per week for 15 weeks of class.

A summary of a weekly timetable guide can be seen in the following table. These figures are obtained from the subject file in the Accreditation Report of the degree, taking into account the level of experimentation considered for the said subject is moderate.

Activity	Weekly school hours
Lectures	4
Laboratory workshop	2
Other activities	4

Nevertheless the previous table can be shown into greater detail, taking into account the following overall distribution:

- 54 hours of lectures, with 50% theoretical demonstration and 50% solving type problems.
- 6 hours of written assessment tests, one hour per test.
- 90 hours of personal study, divided up over the 15 weeks of the 1 st semester.

There is a tutorial calendar timetable set by the teacher that can be requested by the students who want a tutorial.

5.3.Syllabus

This course is required for physics majors and all students in engineering. It will introduce the concepts and practice of Physics. The topics and tools presented here provide the foundation needed in any engineering course. This course will cover elementary mechanics of particles and rigid bodies, Newton's laws, work and energy, and conservation of momentum and energy, among others.

The main topics developed here are:

- What is Physics? Measurement and vectors
- Motion in two and three dimensions
- Newton's laws and forces
- Dynamic of a particle and several particles
- System of particles
- Dynamics of a rigid body
- Statics of particles and rigid bodies
- Fluid statics and dynamics
- Oscillatory motion
- Waves
- Acoustics
- Resonance
- Thermodynamics

5.4.Course planning and calendar

Class hall sessions & work presentations timetable :

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Class room and timetables are officially published at Horario de clases .

The dates of the final exams will be those that are officially published at Distribución de exámenes .

The written assessment tests will be related to the following topics:

- **Test 1** : Kinematics, Dynamics of a particle and several particles, Work, power and energy.
- **Test 2** : System of particles, Dynamic of rigid bodies, Statics of Particles and rigid bodies, Fluid statics and dynamics.
- **Test 3** : Oscillatory motion, Waves, Acoustics, Themodynamics.

Estimated timetable of lectures

1. Units of measurements and vectors. Coordinate systems.
2. Kinematics: distance and displacement, velocity and speed, acceleration.
3. Kinematics: motion in two and three dimensions (linear, parabolic, circular, harmonic, among others).
4. Dynamics: Newton's laws, forces in nature, particle motion, work, power and energy. Conservation of energy.
5. System of particles. Conservation of energy and linear momentum.
6. Dynamics of a rigid body: rotation motion, mass moment of inertia, rotational kinetic energy. Conservation of angular momentum.
7. Statics of a particle and a rigid body: centre of gravity, conditions for equilibrium, equilibrium in a accelerated frame.
8. Fluid statics and dynamics: density, pressure, buoyancy and Archimedes' Principle, fluids in motion.
9. Oscillatory motion: simple harmonic motion, energy in simple harmonic motion, damped oscillations, driven oscillations and resonance.
10. Waves and wave phenomena: properties of a wave, equations, superposition, standing waves.
11. Acoustics and resonance: sound waves, the Doppler Effect.
12. Thermodynamics: temperature and thermal equilibrium, temperature scales, the ideal-gas law.
13. Heat and the First law of Thermodynamics. The internal energy of an ideal gas. Work and the PV diagram for and ideal gas. Thermodynamical processes.
14. The second law of Thermodynamics. Heat engines, refrigerators, the Carnot engine. Applications.
15. Revision activities for the final exam.

Important dates, such as work presentations, laboratory practices, written exams, among other foreseen acitivities will be communicate to the students in the class room or through the Moodle platform a long time in advance.

5.5.Bibliography and recommended resources

Bibliography

Updated bibliography on this subject is available in Spanish and can be consult on the webpage of the library at: http://psfunizar7.unizar.es/br13/eBuscar.php?tipo=a

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