30700 - Physics

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	470 - Bachelor's Degree in Architecture Studies
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 that is designed for this subject is based on the following:

- Theory classes will focus on the explanation of the physical principles as well as on the resolution of selected problems.

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Throughout the semester assessment tests will be conducted in order to check the understanding of the topics under study.

-Scheduled problem classes. In general, each problem class will cover topics belonging to one module. (See the program)

-Laboratory sessions, in which the students must carry out simple physics experiments, under the teacher supervision, and the support of a guide. Students must prepare a lab report for each experiment including their experimental results as well as data analysis and a brief discussion

- Throughout the semester students may be asked to prepare some academic works to be submitted in writing and oral to the teacher.

5.2.Learning tasks

The scheduled activities to achieve the expected learning results are:

Theory and problem classes

At the beginning of the lecture the teacher will make a brief presentation of the subject, referring it to a more general context and highlighting the relationships with other items. Applications of the studied concepts will be emphasizes throughout each session giving general guidelines for problem solving. During problem classes the increase of the participation of students is pursued. The students are encouraged to solve some selected problems and explain them to the class group. Besides, dialogue will be promoted so that the questions/answers of the students should allow the teacher to perceive the learning progress of the group.

Laboratory sessions

The group is divided in several laboratory subgroups -of about 14-16- students that are organized in pairs to carry out the lab work.

The laboratory program is designed according to the scheduled classes of theory. The student will have a detailed script of the practical works to perform as well as guidance on the proper presentation of the results.

Academic work and oral presentations

Students can autonomously perform an academic work (of appropriate level for 1st year students) previously authorized

by the teacher and under his supervision. The work must be submitted in writing, in advance of the compulsory oral presentation.

Tutorial support

Tutorial support is offered to the students, who can book an appointment with the teacher to solve any question concerning the program items.

5.3.Syllabus

Introduction

1. Physical Magnitudes and Units. Dimensional Identities. Measures and Errors.

Principles of Single Particle Mechanics

1. Kinetics of a Single Particle.
2. Newton's Laws.
3. Types of Forces: Applied Forces, Reaction Forces. Torque.
4. Force Diagrams. Equilibrium of a Particle.
5. Linear and Angular Momenta. Dynamics of a Single Particle.
6. Work and Energy. The Conservation of Energy.

Oscillatory Motion

1. Simple Harmonic Motion.
2. Free Damped Oscillations.
3. Forced Damped Oscillations and Resonance.
4. Small Oscillations.

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Mechanics of Many Particle Systems

A. Dynamics

1. Motion of a Many Particle System. Linear momentum of a Many Body System. Centre of Mass.
2. Rigid Body. Rotation around a Fixed Axe. Moment of Inertia. Steiner's Theorem.
3. Equation of Motion of a Rigid Body.

B. Statics of a Rigid Body

1. Equilibrium condition. Types of Reaction Forces.
2. Equivalent Force Systems. Centre of the Force.
3. Internal Stresses.

Introduction to Elasticity

1. Stress and Strain. Elasticity Modules.

Fluid Mechanics

A. Statics

1. Fundamental Equations. Hydrostatic Pressure. Pascal's Principle.
2. Buoyant Forces and Archimede's Principle. Buoyancy.

B. Fluid dynamics

1. Ideal Fluids. Bernouilli's Equation. Forces in Pipes.
2. Viscous Fluids. Poiseuille's Equation. Real Fluids.

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5.4.Course planning and calendar

Lectures (3 or 4 hours a week, on alternate weeks) and laboratory sessions (2 hours a week on alternate weeks for each subgroup) are taught according to the schedule established, published well in advance to the beginning of the term.

The laboratory reports have to be delivered at the end of the corresponding experimental class.

Appointments for oral presentation of academic works will be set up with the students.

5.5.Bibliography and recommended resources

Main Text of Reference

- Sears-Zemansky-Young-Freedman, *University Physics* , Vol.1, Ed. Pearson Addison Wesley, 13 th Ed.

Alternative Choices

- P. Tipler, G. Mosca, *Physics for Scientists and Engineers* , Vol. 1 (Mechanics, Oscillations and Waves, Thermodynamics) 6 th Ed.
- R. A. Serway, J. W. Jewett, *Physics* , Vol. 1, (Mechanics, Oscillations and Waves, Thermodynamics), Ed. Thomson, 7 th Ed.

Complementary Bibliography for Specific Aspects of the Course:

- A.P. French, Oscillations and Waves *.*
- M. Vázquez, E. López, *Mecánica para Ingenieros. Estática-dinámica,* Ed. Noela *,* 7ª ed., 1998.
- F.P. Beer, E.R. Johnston. *Vector Mechanics for Engineers* . McGraw Hill