26801 - Physics

Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	297 - Degree in Optics and Optometry
ECTS	9.0
Year	1
Semester	Annual
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:

Theoretical sessions that consist mainly in participatory lectures.

Problem solving sessions in which the students will defend on the board a selection of proposed problems, discussing the

troubles encountered and the solutions proposed with the teacher and other colleagues.

Laboratory sessions (10), consist of carrying, in pairs, the experiments detailed in the laboratory program and the preparation of a report containing the results of the measurements and the answers to the questions raised in the corresponding guide notes. In the report, students must meet the provisions of the rules. In addition, in order that when students arrive at the laboratory already have a previous idea of the work to be done, they have detailed guide notes of practices where the theoretical foundations and experimental devices to be used are explained.

5.2.Learning tasks

The program offered to help the student to achieve the expected results includes the following activities:

1: *Theoretical and practical sessions solving problems in the classroom* (7 ECTS)

At the beginning of each topic, it provides students both the theoretical content that the teacher will present in class as a collection of about twenty exercises, which are resolved in the classroom about half, leaving the rest for personal student work not.

The exercises chosen for resolution in the classroom should be done by students prior to the related class in which students must perform on the board and defend one of the exercises.

The distribution of credits between lectures and problem solving sessions is approximately 70% -30%

2: *Lab practices* (2 ECTS credits)

Before starting the traineeship programme the student will have a notebook with guide notes of ten practices that have to perform in the laboratory, as well as preliminary information on the correct presentation of reports to be elaborated.

Practices last 2 hours and are the following:

1. Measure of lengths and angles

2. Density of solids and liquids. Surface tension.

3. Measure of the expansion coefficient of solids.

4. Measure of a spring constant.

5. Forced oscillations. Mechanical resonance.

6. Propagation of harmonic waves.

7. Standing waves.

8. Multimeter and oscilloscope management. Ohm's law.

9. Sound waves.

10. Spectroscopy: calibration of a prism spectroscope.

5.3.Syllabus

The course syllabus is as follows:

1. PHYSICAL QUANTITIES AND MEASUREMENTS. Measure of magnitudes. Dimensions. Calculation of experimental uncertainties. Linear dependencies.

2. VECTOR CALCULUS. Scalar and vectorial quantities. Coordinate systems. Vector components. Vector operations.

3. MECHANICS. Path, speed and acceleration. Circular movement. Newton's laws. Frictional force. Speed-dependent forces. Linear momentum and angular momentum. Work and power. Kinetic energy. Conservative forces; potential energy. Principles of conservation: momentum and energy.

4. ELASTICITY. Stresses and strains; Young's modulus. Flexural strength. Shear deformation. Uniform compression deformation. Relationship between longitudinal and transverse strain.

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5. THERMAL PROPERTIES OF MATTER. Definition of temperature; thermometry. thermal expansion. Heat capacity. Phase changes. Heat transfer.

6. FLUIDS. Continuity equation; stationary flow. Bernoulli equation. Viscous fluid. Laminar and turbulent flow. Cohesive forces in liquids: surface tension.

7. SIMPLE ARMONIC MOTION. The simple harmonic oscillator. Energy in a SAM. anharmonic oscillations. SAM relationship with the circular motion. Damped oscillations. Damped and forced oscillations; resonance.

8. WAVE MOTION. Propagation of a disturbance in an elastic medium. Longitudinal waves and transverse waves. Wave propagation equation. Energy and intensity of wave motion. Interference of periodic waves. Reflection and refraction. Polarization. Standing waves.

9. ELECTROSTATIC FIELD. Electric field and potential. Gauss theorem. Electrostatic energy. Conductors. Dipoles. Dielectrics.

10. ELECTRICITY. Current density. Intensity. Potential difference and electromotive force. Ohm's law. Joule effect.

11. ELECTROMAGNETIC FIELD. Magnetic field. Lorentz force. Biot and Savart law. Integral form of Ampere's law. Faraday-Lenz law. Maxwell equations. Electromagnetic plane waves. Poynting vector. Electromagnetic nature of light.

12. QUANTUM PHYSICS. Thermal radiation. Black body. Planck hypothesis. Photoelectric effect. Compton effect. The wavefunction. Superposition principle. Uncertainty relations. Schrödinger equation.

5.4.Course planning and calendar

Schedule sessions and presentation of works

The calendar of classroom sessions is set by the Faculty of Science.

The date of realization of each of the lab sessions will be published at the beginning of the school year by the Grade Coordinator and can be consulted by enrolled students in the web of the subject .

5.5.Bibliography and recommended resources

BB	Física universitaria / Francis W. Sears [et al.] ; contribución de los autores,T.R. Sandin, A. Lewis Ford ; versión en español de Roberto Escalona García ; colaboración técnica José Luis Sebastián Franco, Marcela Villegas . - ed. en español México : Addison-Wesley Longman de México, cop.1998-199
BC	Alonso, Marcelo. Física. Vol. I, Mecánica / Marcelo Alonso, Edward J. Finn ; versión

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	en español de Carlos Hernández...[et al] . - Ed. rev. y aum. México[etc.] : Addison-Wesley Iberoamericana, cop. 1986
BC	Alonso, Marcelo. Física. Vol. II, Campos y ondas / Marcelo Alonso, Edward J. Finn ; versión en español de Carlos Hernández y José A. Barreto Araujo ; con la colaboración de Romulo E. Ballestero . - 1ª ed. rev. y aum., 1ª reimp. Naucalpan de Juárez (Mexico) : Addison Wesley Longman, imp. 1998
BC	Burbano de Ercilla, Santiago. Física general. Tomo 1, Estática, cinemática y dinámica / Santiago Burbano de Ercilla, Enrique Burbano García, Carlos Gracia Muñoz. - 32ª ed. Madrid : Tébar, D.L. 2006
BC	Burbano de Ercilla, Santiago. Física general. Tomo 2, Campo gravitatorio, elasticidad, termodinámica, transferencia de calor, movimientos ondulatorios y electromagnetismo / Santiago Burbano de Ercilla, Enrique Burbano García, Carlos Gracia Muñoz. - 32ª ed. Madrid : Tébar, D.L. 2006
BC	Jou i Mirabent, David. Física para ciencias de la vida / David Jou Mirabent, Josep Enric Llebot Rabagliati y Carlos Pérez García Madrid : McGraw-Hill, D.L. 2002
BC	Kane, Joseph W.. Física / Joseph W. Kane, Morton M. Sternheim . - 2ª. ed., reimp. Barcelona [etc.] : Reverté, 2004
BC	Serway, Raymond A. Física / Raymond A. Serway, John W. Jewett, Jr. ; revisión técnica, José García Solé, Francisco Jaque Rechea. - 3ª ed. Madrid [etc.] : Thomson : Paraninfo, D.L. 2003
BC	Tipler, Paul A.. Física para la ciencia y la tecnología. Vol. 1, Mecánica , oscilaciones y ondas, termodinámica / Paul A. Tipler, Gene Mosca ; [coordinador y traductor José Casas-Vázquez ; traductores Albert Bramon Planas ... et al.]. - 6ª ed. Barcelona : Reverté, D.L. 2010

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BC	Tipler, Paul A.. Física para la ciencia y la tecnología. Vol. 2, Electricidad y magnetismo, luz / Paul A. Tipler, Gene Mosca ; [coordinador y traductor José Casas-Vázquez ; traductores Albert Bramon Planas ... et al.]. - 6ª ed. Barcelona : Reverté, D.L. 2010