Universida_{de}Vigo

IDENTIFYING DATA

(*)Física: Física I

Subject	(*)Física: Física I
Code	V12G350V01102
Study programme	Degree in Industrial Chemical Engineering

Descriptors	ECTS Credits		Choose	Year	Quadmester
	6		Basic education	1st	1st

Teaching language	Spanish Galician
Department	
Coordinator	Lusquiños Rodríguez, Fernando
Lecturers	Álvarez Fernández, María Inés
	Blanco García, Jesús
	Boutinguiza Larosi, Mohamed
	Iglesias Prado, Jose Ignacio
	Legido Soto, José Luís
	Lusquiños Rodríguez, Fernando
	Quintero Martínez, Félix
	Ramos Docampo, Miguel Alexandre
	Ribas Pérez, Fernando Agustín
	Serra Rodríguez, Julia Asunción
	Soto Costas, Ramón Francisco
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General description	(*)Física do primeiro curso das Enxeñarías da rama Industrial

Competencies

Code	
B3	CG3 Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations.
C2	CE2 Understanding and mastering the basics of the general laws of mechanics, thermodynamics, waves and electromagnetic fields, as well as their application for solving engineering problems.
D2	CT2 Problems resolution.
D9	CT9 Apply knowledge.
D10	CT10 Self learning and work.

Learning outcomes

Expected results from this subject	Training and Learning Results		
(*)FB2a. Comprensión y dominio de los conceptos básicos sobre las leyes generales de la mecánicaB3 y campos y ondas y su aplicación para la resolución de problemas propios de la ingeniería.		C2	
(*)CG3. Conocimiento en materias básicas y tecnológicas, que les capacite para el aprendizaje de nuevos métodos y teorías, y les dote de versatilidad para adaptarse a nuevas situaciones.		C2	
(*)CS2. Aprendizaje y trabajo autónomos.	B3	C2	D9 D10
New	B3	C2	D2 D9 D10

Contents

Topic

1.- UNITS, PHYSICAL AMOUNTS AND VECTORS	1.1.- The nature of Physics. 1.2.- Consistency and conversions of units. 1.3.- Uncertainty and significant figures. 1.4.- Estimates and orders of magnitude. 1.5.- Vectors and sum of vectors. 1.6.- Vector components. 1.7.- Unitary vectors. 1.8.- Vector products. 1.9.- Sliding Vectors
2.- CINEMATIC OF THE POINT	2.1.- Vectors of position, speed and acceleration. Half and instantaneous values 2.2.- Vectors angular speed and angular acceleration. Half and instantaneous values. 2.3.- Relation between linear cinematic magnitudes and angular 2.4.- Intrinsic components. 2.5.- Study of simple movements: *mov. Rectilinear, *mov. Circulate, shot *oblicuo 2.6.- Expressions of cinematic magnitudes in coordinates *cartesianas and polar
3.- LAWS OF THE MOVEMENT OF NEWTON	3.1.- Strength and interactions. 3.2.- First law of Newton. Systems of inertial reference and no inertial. 3.3.- Second law of Newton. 3.4.- Mass and weight. 3.5.- Third law of Newton. 3.6.- Quantity of movement. Mechanical impulse. Angular moment. 3.7.- Strengths of contact: active, of *ligadura.
4.- WORK AND KINETIC ENERGY	4.1.- Work realized by a Force. Power. 4.2.- Kinetic Energy. 4.3.- Conservative Forces 4.4.- Elastic potential energy. 4.5.- Potential energy in the gravitatory field. 4.6.- Mechanical energy. 4.7.- Strength and potential energy. 4.8.- Principle of conservation of the mechanical energy.
5.- KINEMATICS OF SYSTEM OF POINTS	5.1.- Points system. 5.2.- Rigid solid. 5.3.- Translation movement. 5.4.- Movement of rotation around a fixed axis. 5.5.- General movement. 5.6.- Instant center of rotation. 5.7.- Rolling motion. 5.8.- Relative movement.
6.- DYNAMICS OF THE SYSTEMS OF PARTICLES	6.1.- Systems of particles. Inner and exterior strengths. 6.2.- Center of masses of the system. Movement of the c.o.m. 6.3.- Equations of the movement of a system of particles. 6.4.- Linear moment. Theorem Of conservation. 6.5.- Angular moment of a system of particles. Theorem Of conservation. 6.6.- Work and power. 6.7.- Potential energy and kinetics of a system of particles. 6.8.- Theorem Of the energy of a system of particles. 6.9.- Crashes.
7.- DYNAMICS OF THE RIGID SOLID	7.1.- Rotation of a rigid solid around a fixed axis. 7.2.- Moments and products of inertia. 7.3.- Calculation of moments of inertia. 7.4.- Steiner's theorem. 7.5.- Moment of a force and pair of forces. 7.6.- Equations of the general movement of the rigid solid. 7.7.- Kinetic energy in the general movement of the rigid solid. 7.8.-Work in the general movement of the rigid solid. 7.9.- Angular moment of a rigid solid. Conservation theorem.
8.- STATIC	8.1.- Balance of rigid solids. 8.2.- Center of gravity. 8.3.- Stability. 8.4.- Degrees of freedom and ligatures

9.- PERIODIC MOVEMENT	9.1.- Description of the oscillation. 9.2.- Simple harmonic movement. 9.3.- Energy in the simple harmonic movement. 9.4.- Applications of simple harmonic movement. 9.5.- The simple pendulum. 9.6.- The physical pendulum. 9.7.- Damped oscillations. 9.8.- Forced oscillations and resonance.
10.- FLUID MECHANICS	10.1.- Density. 10.2.- Pressure in a fluid. 10.3.- Fundamental principles of Fluidostática. 10.4.- Continuity equation. 10.5.- Bernoulli equation.
11.- MECHANICAL WAVES	11.1.- Types of mechanical waves. 11.2.- Periodic waves. 11.3.- Mathematical description of a wave. 11.4.- Speed of a transverse wave. 11.5.- Energy of the wave movement. 11.6.- Wave interference, boundary conditions and superposition. 11.7.- Stationary waves on a string. 11.8.- Normal modes of a rope.
LABORATORY	1.- Theory of Measurements, Errors, Graphs and Adjustments. Examples 2.- Reaction Time. 3.- Determination of the density of a body. 4.- Relative Movement. 5.- Instantaneous speed. 6.- Study of the Simple Pendulum. 7.- Experiences with a helical spring. 8.- Damped and forced oscillations. 9.- Moments of inertia. Determination of the radius of rotation of a body. 10.- Stationary waves.
LABORATORY NO STRUCTURED	1. Sessions with activities no structured (open practice) that range the theoretical contents of the practices enumerated up. The groups of students have to resolve a practical problem proposed by the professor, selecting the theoretical frame and experimental tools to obtain the solution; for this, dispondrán of basic information and guide of the professor

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	24.5	45	69.5
Problem solving	8	20	28
Laboratory practical	18	18	36
Objective questions exam	1	0	1
Problem and/or exercise solving	3.5	0	3.5
Essay questions exam	3	0	3
Practices report	0	9	9

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Exhibition by part of the professor of the contents on the subject object of study, theoretical bases and/or guidelines of a work, exercise or project to develop by the student.
Problem solving	Activity in which formulate problem and/or exercises related with the asignatura. The student has to develop the felicitous or correct solutions by means of the ejercitación of routines, the application of formulas or algorithms, the application of procedures of transformation of the available information and the interpretation of the results. suele Use as I complement of the lesson magistral.
Laboratory practical	Activities of application of the knowledges to concrete situations and of acquisition of basic skills and procedimentales related with the subject object of study. They develop in special spaces with equipment especializado (laboratories, classrooms informáticas, etc).

Personalized assistance

Methodologies	Description
Lecturing	In office hours

Laboratory practical	in office hours
Problem solving	In office hours
Tests	**Description**
Objective questions exam	In office hours
Problem and/or exercise solving	In office hours
Essay questions exam	In office hours
Practices report	In office hours

Assessment

	Description	Qualification	Training and Learning Results
Objective questions exam	(*)Probas para avaliación de as competencias adquiridas que inclúen preguntas pechas con diferentes alternativas de resposta (verdadeiro/falso, elección múltiple, emparejamiento de elementos...). Os alumnos seleccionan unha resposta entre un número limitado de posibilidades.	10	B3 C2
Problem and/or exercise solving	(*)Proba en a que o alumno debe solucionar unha serie de problemas e/ou exercicios en un tempo/condiciones establecido/as por o profesor. De este xeito, o alumno debe aplicar os coñecementos que adquiriu.	40	B3 C2 D2
Essay questions exam	(*)Probas para avaliación de as competencias que inclúen preguntas abertas sobre un tema. Os alumnos deben desenvolver, relacionar, organizar e presentar os coñecementos que teñen sobre a materia en unha resposta extensa.	40	B3 C2
Practices report	(*)Elaboración de un documento por parte de o alumno en o que se reflicten as características de o traballo levado a cabo. Os alumnos deben describir as tarefas e procedementos desenvolvidos, mostrar os resultados obtidos ou observacións realizadas, así como a análise e tratamento de datos.	10	B3 C2 D9 D10

Other comments on the Evaluation

The ECA grade will be obtained through justifiedresponse tests on classroom contents. The ECL qualification will be obtained as the sum ofthe qualification of the Reports / memories of practices on laboratorycontents. To obtain an ECL qualification, attendance will be required at least10 of the 12 laboratory sessions scheduled. Those students who can not follow the continuousassessment and who have been granted the rejection of the continuous assessmentwill have the possibility of taking a final written test to obtain a REC gradethat will weigh 30% of the final grade and will include both the contents ofthe laboratory practices (weight of 20%, which we will call RECL rating) asclassroom (weight of 10%, which we will call RECA rating). The remaining 70% of the final grade will be obtainedby completing a final exam that will consist of two parts: a theoretical part(which we will call T) that will weigh 30% of the final grade and another partof problem solving (which we will call P) that will have a weight of 40% ofthe final grade. The theoretical part will consist of an eliminatory test typetest (that we will denominate TT) on fundamental theoretical concepts, thatwill have a weight of 10% of the final qualification and where a minimumqualification of 50% will be required, and another test oftheoretical-practical questions of justified response (which we will call TC),which will have a weight of 20% of the final grade. Those students who do notappear for the final exam will obtain a grade of not presented. Both the final exams and those that are held on datesand / or times different from those officially set by the center, may have anexam format different from the one previously described, although the parts ofthe exam retain the same value in the final grade. Final grade G of the subject for the continuousassessment modality: G = ECL + ECA + TT + TC + P, where TC and P are addedonly if TT is exceeded. Final grade G of the subject for the evaluationmodality at the end of the semester and July (the RECL and RECA options onlyfor students with waiver granted): G = ECL (or RECL) + ECA (or RECA) + TT + TC + P, whereTC and P are added only if TT is exceeded. Ethical commitment: The student is expected to exhibitadequate ethical behavior. In the case of detecting unethical behavior(copying, plagiarism, unauthorized use of electronic devices, etc.), thestudent will be considered not to meet the necessary requirements to pass thesubject. In this case, the overall grade in the current academic year will besuspended (0.0).

The use of any electronicdevice during the evaluation tests will not be allowed unless expresslyauthorized. The fact of introducing an electronic device not authorized in theexam room will be considered a reason for not passing the subject in thisacademic year and the overall rating will be suspended (0,0).

Sources of information
Basic Bibliography

1. Young H.D., Freedman R.A., **Física Universitaria, V1**, 13ª Ed., Pearson,

Complementary Bibliography

2. Tipler P., Mosca G., **Física para la ciencia y la tecnología, V1**, 5ª Ed., Reverté,

3. Serway R. A., **Física para ciencias e ingeniería, V1**, 7ª Ed., Thomson,

4. Juana Sardón, José María de, **Física general, V1**, 2ª Ed., Pearson Prentice-Hall,

5. Bronshtein, I. Semendiaev, K., **Handbook of Mathematics**, 5ª Ed., Springer Berlín,

6. Jou Mirabent, D., Pérez García, C., Llebot Rabagliati, J.E., **Física para ciencias de la vida**, 2ª Ed., McGraw Hill Interamericana de España S.L.,

7. Cussó Pérez, F., López Martínez, C., Villar Lázaro, R., **Fundamentos Físicos de los Procesos Biológicos**, 1ª Ed, ECU,

8. Cussó Pérez, F., López Martínez, C., Villar Lázaro, R., **Fundamentos Físicos de los Procesos Biológicos, Volumen II**, 1ª Ed, ECU,

9. Villar Lázaro R., López Martínez, C., Cussó Pérez, F., **Fundamentos Físicos de los Procesos Biológicos, Volumen III**, 1ª Ed, ECU,

10en. Villars, F., Benedek, G.b., **Physics with Illustrative Examples from Medicine and Biology**, 2ª Ed., AIP Press/Springer-Verlag,

Recommendations

Other comments

Recommendations:

1. Basic knowledge acquired in the subjects of Physics and Mathematics in previous courses.

2. Capacity for written and oral comprehension.

3. Abstraction capacity, basic calculation and synthesis of information.

4. Skills for group work and group communication.

In case of discrepancy between versions, the Spanish version of this guide will prevail.