



IDENTIFYING DATA

(*)Física: Física I

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|---------------------|---|-----------------|------|------------|
| 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 Trillo Yáñez, María Cristina Wallerstein Figueirôa, Daniel | | | |
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| Web | http://faiic.uvigo.es | | | |
| General description | (*)Física do primeiro curso das Enxeñaría 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 mecánica y campos y ondas y su aplicación para la resolución de problemas propios de la ingeniería. | B3 | C2 | D9 D10 |
| (*)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. | B3 | C2 | D2 D9 D10 |
| (*)CS2. Aprendizaje y trabajo autónomos. | 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 | <p>9.1.- Description of the oscillation.</p> <p>9.2.- Simple harmonic movement.</p> <p>9.3.- Energy in the simple harmonic movement.</p> <p>9.4.- Applications of simple harmonic movement.</p> <p>9.5.- The simple pendulum.</p> <p>9.6.- The physical pendulum.</p> <p>9.7.- Damped oscillations.</p> <p>9.8.- Forced oscillations and resonance.</p> |
| 10.- FLUID MECHANICS | <p>10.1.- Density.</p> <p>10.2.- Pressure in a fluid.</p> <p>10.3.- Fundamental principles of Fluidostática.</p> <p>10.4.- Continuity equation.</p> <p>10.5.- Bernoulli equation.</p> |
| 11.- MECHANICAL WAVES | <p>11.1.- Types of mechanical waves.</p> <p>11.2.- Periodic waves.</p> <p>11.3.- Mathematical description of a wave.</p> <p>11.4.- Speed of a transverse wave.</p> <p>11.5.- Energy of the wave movement.</p> <p>11.6.- Wave interference, boundary conditions and superposition.</p> <p>11.7.- Stationary waves on a string.</p> <p>11.8.- Normal modes of a rope.</p> |
| LABORATORY | <p>1.- Theory of Measurements, Errors, Graphs and Adjustments. Examples</p> <p>2.- Reaction Time.</p> <p>3.- Determination of the density of a body.</p> <p>4.- Relative Movement.</p> <p>5.- Instantaneous speed.</p> <p>6.- Study of the Simple Pendulum.</p> <p>7.- Experiences with a helical spring.</p> <p>8.- Damped and forced oscillations.</p> <p>9.- Moments of inertia. Determination of the radius of rotation of a body.</p> <p>10.- Stationary waves.</p> |
| LABORATORY NO STRUCTURED | <p>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</p> |

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 justified response tests on classroom contents. The ECL qualification will be obtained as the sum of the qualification of the Reports / memories of practices on laboratory contents. To obtain an ECL qualification, attendance will be required at least 10 of the 12 laboratory sessions scheduled. Those students who can not follow the continuous assessment and who have been granted the rejection of the continuous assessment will have the possibility of taking a final written test to obtain a REC grade that will weigh 30% of the final grade and will include both the contents of the laboratory practices (weight of 20%, which we will call RECL rating) as classroom (weight of 10%, which we will call RECA rating). The remaining 70% of the final grade will be obtained by 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 part of problem solving (which we will call P) that will have a weight of 40% of the final grade. The theoretical part will consist of an eliminatory test type test (that we will denominate TT) on fundamental theoretical concepts, that will have a weight of 10% of the final qualification and where a minimum qualification of 50% will be required, and another test of theoretical-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 not appear for the final exam will obtain a grade of not presented. Both the final exams and those that are held on dates and / or times different from those officially set by the center, may have an exam format different from the one previously described, although the parts of the exam retain the same value in the final grade. Final grade G of the subject for the continuous assessment modality: $G = ECL + ECA + TT + TC + P$, where TC and P are added only if TT is exceeded. Final grade G of the subject for the evaluation modality at the end of the semester and July (the RECL and RECA options only for students with waiver granted): $G = ECL$ (or RECL) + ECA (or RECA) + TT + TC + P, where TC and P are added only if TT is exceeded. Ethical commitment: The student is expected to exhibit adequate ethical behavior. In the case of detecting unethical behavior (copying, plagiarism, unauthorized use of electronic devices, etc.), the student will be considered not to meet the necessary requirements to pass the subject. In this case, the overall grade in the current academic year will be suspended (0.0).

The use of any electronic device during the evaluation tests will not be allowed unless expressly authorized. The fact of introducing an electronic device not authorized in the exam room will be considered a reason for not passing the subject in this academic 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.
