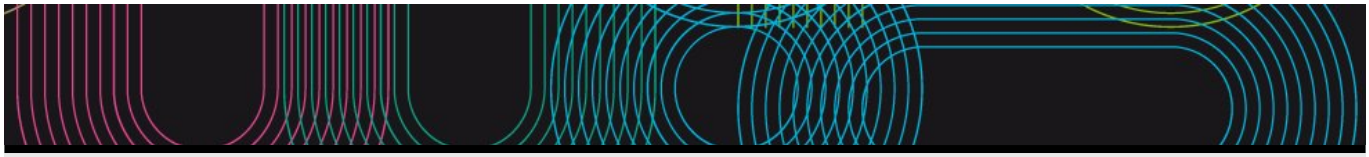
Universidade Vigo

Subject Guide 2017 / 2018



IDENTIFYING DATA				
Physics: Physics I				
Subject	Physics: Physics I			
Code	V11G200V01102			
Study programme	(*)Grao en Química			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	Spanish			
Department				
Coordinator	Pérez Iglesias, María Teresa			
Lecturers	Legido Soto, José Luís Pérez Iglesias, María Teresa			
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General description	General Physics is the general scientific analysis of nature, with the goal of understanding how the universe behaves. It is fundamentally an experimental science. The theories that are developed are tested with observations. From such a wide definition, different perspectives or application levels can be adopted, from microscopic phenomena to macroscopic ones. Physics is thus the basis of innumerable scientific and technological applications. In particular for the student of Chemistry, it is a fundamental tool to understand theories and methods belonging to that of domain of science.			

Competencies	
Code	
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
C23	Present oral and written scientific material and scientific arguments to a specialized audience
D1	Communicate orally and in writing in at least one of the official languages of the University
D3	Learn independently
D4	Search and manage information from different sources
D6	Use mathematics, including error analysis, estimates of orders of magnitude, correct use of units and data representations
D7	Apply theoretical knowledge in practice
D8	Teamwork
D9	Work independently
D12	Plan and manage time properly
D13	Make decisions
D14	Analyze and synthesize information and draw conclusions
D15	Evaluate critically and constructively the environment and oneself

Learning outcomes			
Expected results from this subject	Training and Learning Results		
Calculate the values of different kinematic magnitudes of a mechanical system when it starts from initial different conditions.	A5	C23	D1 D3 D6 D8 D9 D14

Describe the framework of classical mechanics and calculate for a mechanical system the values of its different magnitudes.	A5	C23	D1 D3 D4 D6 D8 D9 D12 D13 D14 D15
Explain the importance of the conservation theorems and apply some of them.	A5	C23	D1 D3 D4 D6 D7 D14
Describe and calculate the kinematic and dynamic magnitudes of a system that undergoes a simple harmonic motion.	A5	C23	D3 D6 D7
Enunciate the postulates and principles of thermodynamics.	A5	C23	D1 D3 D4 D12 D13 D14
Explain the concept of thermodynamic system and its description using the corresponding variables and thermodynamic potentials.	A5	C23	D1 D3 D4 D12 D13 D14
Define the different temperature scales. Convert temperature values from one scale to another.	A5	C23	D1 D3 D6 D7 D12 D13 D14 D15
Calculate the work carried out by a thermodynamic system and the heat exchanged with the environment, as well as the variation of internal energy, enthalpy and entropy in quasiestatic processes.	A5	C23	D1 D3 D4 D6 D12 D13 D14
Distinguish between reversible and irreversible processes from the behaviour of the entropy variation.	A5	C23	D1 D3 D4 D6 D12 D13 D14

Contents

Topic	
1. DESCRIPTION OF THE PHYSICAL REALITY	Introduction - Physical magnitudes and units - Dimensional analysis Errors.
2. KINEMATICS OF THE POINT AND RIGID BODY	Material point - Vector position, velocity and acceleration - Tangent and normal components of the acceleration - Study of some movements: rectilinear and plane - Rigid body.
3. PRINCIPLES OF THE DYNAMICS	Concept of force - Newton Law s - Newton´s theory of gravitation.
4. DYNAMICS OF THE PARTICLE	Equations of motion - Momentum and angular momentum - Radial Forces: Conservation of the angular momentum - Work and power - Kinetic Energy - Conservation of the mechanical energy - Non conservative forces. The conservation of energy. - Energy diagrams.
5. OSCILLATING MOTION	Simple harmonic Motion: Kinematics, Dynamics and Energy.

6. DYNAMICS OF SYSTEMS OF PARTICLES	Internal and external forces - Equation of motion for the center of mass - Work of external and internal forces Collisions.
7. THE RIGID BODY	Rigid Body: Rotational motion: Moment of inertia, angular momentum, Kinetic Energy.
8. FLUIDS	Pressure and density. Pressure in a fluid at rest. Measurement of pressure Surface Tension Capillarity. Jurin´s Law Tate´s Law.
9. INTRODUCTION TO THE THERMODYNAMICS. THERMOMETRY	Macroscopic and microscopic description - Thermal equilibrium - Zero´th law of Thermodynamics. Temperature Measure of temperature. Thermometers - Ideal Gas. Ideal gas temperature scale.
10. HEAT AND WORK	Thermodynamic Equilibrium. Equations of state. Quasiestatic Processes - Thermodynamic work - Heat capacity and specific heat. Latent heat.
11. THE FIRST LAW OF THERMODYNAMICS	The First Law of Thermodynamics - Internal Energy, enthalpy and heat capacities of the ideal gases. Mayer´s Law -Adiabatic changes of an ideal gas.
12. THE SECOND LAW OF THERMODYNAMICS	Introduction - Second Law: Clausius and Kelvin-Planck Statements - Cycle of Carnot. Theorem of Carnot- Thermodynamic Scale of Temperatures - Inequality of Clausius- Entropy.

Planning

	Class hours	Hours outside the classroom	Total hours
Seminars	26	28.6	54.6
Master Session	26	28.6	54.6
Presentations / exhibitions	0	15	15
Short answer tests	1.5	4.5	6
Troubleshooting and / or exercises	4.5	15.3	19.8

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

Methodologies

	Description
Seminars	a) Exercises and problems will be solved, by the students or the teacher. Problems sheets will be available with sufficient anticipation. b) Doubts and difficult concepts will be discussed and clarified by group tutoring. c) Diverse tasks that students have to carry out will be programmed. d) Diverse tasks that students have to carry out will be tested.
Master Session	The student can find information on lectures at the web platform Thema. a) In each topic the specific objectives will be analyzed. Its need and the possible applications will be indicated. b) The way to get objectives will be indicated. Emphasis will be made on those aspects that are more problematic and difficult. Different examples will be solved. c) In necessary case, it would be proposed some bibliographic references.
Presentations / exhibitions	The students will work in group. They will solve and they will debate problems, questions, summaries of readings, etc. that they will present or will explain to their classmates.

Personalized attention

Methodologies	Description
Presentations / exhibitions	Guided activities could need personalized attention. Voluntary Tutorials allows the clarification of doubts on an individual basis.
Seminars	The activities that will carry out in Seminars could need personalized attention. Voluntary Tutorials allows the clarification of doubts on an individual basis.

Assessment

	Description	Qualification	Training and Learning Results

Seminars	Solving problems and other assignments that have been carried out in seminars.	25	A5	C23	D1 D3 D4 D6 D7 D8 D9 D12 D13 D14 D15
Presentations / exhibitions	The students will work in group and will solve and/ or will debate problems, questions etc.	10		C23	D1 D4 D8 D12
Short answer tests	Three tests written: a) The mínimum mark to pass each exam will be 5 out of 10. b) The third test will be done with the first term final exam. c) The marks of the two first tests will be maintained until the extraordinary exam (june). d) In first term final exam each student will have the opportunity to repeat the test he/ she has failed or those where he/she wishes to improve the mark previously obtained.	15	A5	C23	D3 D6 D7 D9 D13
Troubleshooting and / or exercises	Three tests written: a) The mínimum mark to pass each exam will be 5 out of 10. b) The third test will be done with the first term final exam. c) The marks of the two first tests will be maintained until the extraordinary exam (june). d) In first term final exam each student will have the opportunity to repeat the test he/ she has failed or those where he/she wishes to improve the mark previously obtained.	50	A5	C23	D3 D6 D7 D9 D13

Other comments on the Evaluation

Extraordinary exam (june) assessment: a) Written test to recover the written tests that were failed in the first term final exam. The criteria of evaluation in the second call will be the same as in the first term final exam assessment.

Sources of information

Basic Bibliography

Complementary Bibliography

Tipler P.A.; Mosca G., **Física para la ciencia y la tecnología (2 volumes)**, 2010,

Gettys E., **Física para ingeniería y ciencias**, 2005,

Serway R.A., **Física**, 2009,

José Mª de Juana, **Física General (2 tomos)**, 2003,

Young; Freedman, **Física universitaria I**, 2013,

Recommendations

Subjects that continue the syllabus

Physics: Physics II/V11G200V01201
Chemistry, physics and geology: Integrated laboratory II/V11G200V01202
Physics III/V11G200V01301

Subjects that are recommended to be taken simultaneously

Mathematics: Mathematics I/V11G200V01104
Chemistry, physics and biology: Integrated laboratory I/V11G200V01103

Other comments

It is recommended that students had studied Physics and Mathematics in 2nd level of high school.

In particular students should be familiar with:

- Vector algebra.
- Matrix algebra.
- Polynomial algebra.
- Graphic representation of polynomial, trigonometrical, logarithmic and exponential functions.

- Differential and integral calculus.