Teaching Guide					
Identifying Data					2013/14
Subject (*)	Física			Code	610G02002
Study programme	Grao en Bioloxía				
Descriptors					
Cycle	Period		Year	Type	Credits
Graduate	2nd four-month period		First	FB	6
Language	SpanishGalicianEnglish				
Prerequisites					
Department	Física				
Coordinador	Domínguez Pérez, Montserrat		E-mail	montserrat.dominguez.perez@udc.es	
Lecturers	Cabeza Gras, Oscar Domínguez Pérez, Montserrat Segade Zas, Luisa Maria		E-mail	oscar.cabeza@udc.es montserrat.dominguez.perez@udc.es luisa.segade@udc.es	
Web					
General description	La materia de Física está planteada con el fin de que los alumnos adquieran una serie de conocimientos sobre los conceptos físicos básicos y su aplicabilidad en la biología, los cuales serán necesarios para abordar el estudio de otros campos y materias dentro de la titulación.				

Study programme competences	
Code	Study programme competences
A6	Catalogar, avaliar e xestionar recursos naturais.
A22	Describir, analizar, avaliar e planificar o medio físico.
A26	Deseñar experimentos, obter información e interpretar os resultados.
A28	Desenvolver e implantar sistemas de xestión relacionados coa Bioloxía.
A29	Impartir coñecementos de Bioloxía.
A30	Manexar adecuadamente instrumentación científica.
A31	Desenvolverse con seguridade nun laboratorio.
B1	Aprender a aprender.
B2	Resolver problemas de forma efectiva.
B3	Aplicar un pensamento crítico, lóxico e creativo.
B4	Traballar de forma autónoma con iniciativa.
B5	Traballar en colaboración.
B8	Sintetizar a información.
B10	Exercer a crítica científica.
C1	Expresarse correctamente, tanto de forma oral coma escrita, nas linguas oficiais da comunidade autónoma.
C3	Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.
C4	Desenvolverse para o exercicio dunha cidadanía aberta, culta, crítica, comprometida, democrática e solidaria, capaz de analizar a realidade, diagnosticar problemas, formular e implantar solucións baseadas no coñecemento e orientadas ao ben común.
C8	Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.

Learning outcomes			
Subject competencies (Learning outcomes)	Study programme competences		
To know the basic physical concepts in the different parts of Physics, as: Mechanics, Fluids, Waves, Thermodynamics, Electromagnetism and Optics.	A22	B2	
Know how to relate the physical concepts with the biology phenomena.	A6 A26	B10	C8

Apply the theoretical knowledge to the resolution of basic physical problems, mainly focused to resolve biologycal phenomena.	A22 A26	B1 B2 B8	
To know and to use the methodologies, bibliographic sources and technical concepts corresponding to Physics, using the scientific method to its study.	A28 A29 A30	B3 B4	C3
Learn the basic Physics Laboratory techniques, like to measure fundamental physical magnitudes as density, viscosity, surface tension, specific heat...	A26 A30 A31	B5 B8	C1 C4

Contents	
Topic	**Sub-topic**
Introducction to Physicas .	Physical Magnitudes. Measuremente, dimensions and unities.
Vector Analysis	Vectors. Types. Components Operations with vectors Momentum of a vector
Motion Descripcion	Kinematics. Movement. Characteristics Speed and acceleration Types of movements.
Motion and Forces	Dynamics. Newton Movement Laws Movement Quantity Gravity Force Types of forces Friction
Equilibrium Study	Static Principles Center of mass Moment of inertia. Steiner Theorem
Biomecanics. Scale Laws	Muscular strength. Momentum Scale Laws. Metabolic Rate
Mecanical Energy. Conservation	Work and Power Kinetic and Potential Energy Energy Conservation
Deformed Media	Elasticity. Hooke's Law Traction. Young's Module Lateral Contraction. Poisson Coefficient Compresibility Coefficient Flexion Cutting Torsion
Ideal Fluids. Statics and Dynamics	Density Pressure. Magnitudes, unities and measurement Fundamental Equation of Hydrostatics Pascal and Archimedes Principles Continuity Equation Bernouilli`s Theorem. Aplications

Real Fluids	Viscosity Fluids Flow modes Reynolds' Number Laminar Regime. Poiseuille Equation Viscosity Measurement. Ostwald Viscometer Movement of solids through fluids
Surface Phenomena	Molecular Forces. Surface Tension Laplace's Law Capillarity. Jurin's Law
Harmonical and Wavy Movements	Simple Harmonic Movement. Pendulum Wave Types Wavy Movement Equation Speed of wave propagation Energy and intensity of the wavy movement Doppler Effect
Acoustics. Ultrasounds	Speed of Sound Noise Quality Sound Sensation Reverberation Ultrasounds
Thermodynamics. Temperature.	Thermodynamical Systems Thermodynamical variables Thermodynamical processes Zero Principle of Thermodynamics. Temperature. Temperature Measurement. Escales and thermometers
Gas Study.State Equations	Ideales Gas. Laws State Equation Real Gas.Van der Waals' Equation Kinetic Theory of Gas
First Principle of Thermodynamics	Heat and Work. Internal Energy Thermodynamic Work P-V Diagram Nature and Effects of Heat Heat Transmission Internal Energy First Principle of Thermodynamics Entalpía Transformaciones de los gases ideales
Second Principle of Thermodynamics	Thermal Machine Concept Two forms for the Second Principle of Thermodynamics Carnot Cicle Entropy Concept. Entropy Calculation

Concepts on electricity and bio-magnetism	Electrical Charge. Coulomb's Law Electrical Field and Potential Dipoles Capacity. Capacitors Current Intensity. Ohm's Law Electrical resistivity and conductivity Electrical Current Energy Magnetic Forces Leyes de Laplace y Faraday Corrientes alternas
Radiation and radioactivity	De Broglie's relationship Bonding Energy. Mass Loss Fision and fusion Radiactivity. Atom Splitting Physical and Biological Dosimetry Biological Effects of Radiation
Notions on Optics	Electromagnetic waves Lens and Mirrors Optical Instruments

Planning			
Methodologies / tests	Ordinary class hours	Student?s personal work hours	Total hours
Introductory activities	1	0	1
Document analysis	0	1	1
Laboratory practice	14	14	28
Problem solving	8	24	32
Objective test	4	0	4
Guest lecture / keynote speech	24	48	72
Supervised projects	0	9	9
Personalized attention	3	0	3
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
Methodologies	Description
Introductory activities	The first day of the course we will give to each student the program of this Subject, the metodology we will follow, the evaluation criteria, and also a detailled calendar with all activities.
Document analysis	We will probide to students the necessary bibliographical data, both for problems, theory and assisted jobs. Thus, they could revise and increase the aspects explained in the classroom. The individual tutorials will help also in those aspects.
Laboratory practice	Along the six Laboratory sessions students will work in couples, doing five complete practices. A guide for each practice will be given to teh student, and they will have all necessary material to mount and do them. All time students will be assisted by its teacher to resolve all doubts and help if necessary. At the end of practice time, each couple will present a memory including the job performed and the obtained results. Prior to the Laboratory sessions there will be a room session to explain the basis of experimental uncertainties and graphical representations.

Problem solving	After the theoretical exposition of each lesson, there will be Seminars (with a reduced number of students) to resolve problems to apply the theory studied. The proposed problems for each lesson will be given to the students before each of those sessions as bulletins. There we will include the numerical solution of each problem, to allow students evaluate themselves after doing them individually. Those bulletins will be of two different types: some of them General (the same for all students of the three groups), and other complementary bulletins specific for each reduced group. Not all problems will be completely resolved in the Seminars, but only those more difficult.
Objective test	There will be two written exams about the theory and numerical problems saw in classroom. The first one at the middle of the course and the second one at the end. The students that pass each of those exams will have that part of the subject passed for the Final exams of June (and Jully).
Guest lecture / keynote speech	The basic content of the different parts of the Subject will be explained by the teacher in this sessions, trying to involve students in the learning process. At the end of each session will be in the Moodle the material used that day to facilitate pupils its study.
Supervised projects	Voluntarily the students can do complementary work. That will be do in pairs of students and will be focused in applications of Physics to Biology, including notions of electricity, optics and modern physics.

Personalized attention	
Methodologies	**Description**
Document analysis Laboratory practice Supervised projects	Students will be attended individually to help them to understand and resolve all problems related with the subject they can have, including: bibliography, problems of the bulletin, the complementary work... In resume all doubts they can have in the study and comprenhesion of physic subject.

Assessment		
Methodologies	**Description**	**Qualification**
Laboratory practice	The total calification of Laboratory will be the 15 % of the final calification. This will have three different parts: - A 5% will correspond with the Laboratory note book given to the teacher with the five practices made. - Other 5% will represent the evaluation of the practice made the sixth day of Laboratory. - The last 5% will come from the evaluation of a test exam that all students must do with the official exams in June or July. The attendance to the session previous to Laboratory is mandatory to be evaluated. The laboratory calification will be pass if you obtain a minimum of 0.7 pts (on 1.5 pts).	15
Problem solving	The attendance and participation in the Seminars will represent a 5% of the final calification.	5
Objective test	The theoretical exams made along the course will count a 21 % to the final calification, while the problems exam will be a 49 % of that. The addition of both califications (theory and problems) must be 4/10 points minimum to pass the subject.	70
Supervised projects	The voluntary job calification will count a 10% of the global one.	10

Assessment comments
The NP (non presented) calification will be given to those estudents that do not finish Laboratory and they have not attend to the different tests. In the July opportunity will be saved the califications of Laboratory, Voluntary job and Seminars of problems. Remember that Laboratory job calification (including if it were less than 0.7/1.5) is mandatory to pass the subject.

Sources of information

Basic	- Kane y Sternheim (1994). Física. Barcelona. Reverté. - Cussó, López y Villar (2004). Física de los procesos biológicos. Barcelona. Ariel - Jou, Llebot y Pérez (1994). Física para las ciencias de la vida . Barcelona. Mc. Graw- Hill - Feynman, R. P. (2005). The Feynman lectures on physics. Vol. I, II and III. Addison-Wesley
Complementary	- (). . - Tippler, P (2005). Fisica I y II. Barcelona. Reverté - Ortuño (1996). Física para biología, medicina, veterinaria y farmacia . Barcelona. Crítica - Burbano y Burbano (1991). Problemas de Física . Barcelona. Mira

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Matemáticas/610G02003
Other comments

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.