



IDENTIFYING DATA

Physics: Physics II

Subject	Physics: Physics II			
Code	V10G061V01203			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	2nd	1st
Teaching language	#EnglishFriendly Galician			
Department				
Coordinator	Lugo Latas, Luis			
Lecturers	Lugo Latas, Luis			
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Web	http://https://mar.uvigo.es/			
General description	Physics, as a science, deals with the description of matter and its interactions, developing theories in accordance with empirical knowledge. From this definition one can study nature from the smallest scales (subatomic) to the macroscopic scale, hence the different branches of Physics. Physics is the base of an uncountable number of scientific and technological applications, and in particular for the Sea Sciences student it's a basic tool to understand other theories and subjects in the following years of the grade. The knowledge and application of laws and principles studied in Physics allows the interpretation of the marine environment and the development of models related with it. Furthermore, it is important to understand the fundamental physics concepts to understand how the instruments work and to know how to use and control them.			

English Friendly subject: International students may request from the teachers: a) resources and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.

Training and Learning Results

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
B1	Know and use vocabulary, concepts, principles and theories related to oceanography and apply everything learned in a professional and/or research environment.
B3	Recognize and implement good practices in measurement and experimentation, and work responsibly and safely both in field surveys and in the laboratory.
C1	know at a general level the fundamental principles of sciences: Mathematics, Physics, Chemistry, Biology and Geology.
C4	Know, analyze and interpret the physical properties of the ocean according to current theories, as well as to know the most relevant sampling tools and techniques.
C5	Formulate the mass, energy and moment conservation equations for geophysical fluids and solve them in basic oceanic processes.
D1	Develop the search, analysis and synthesis of information skills oriented to the identification and resolution of problems.
D2	Acquire the ability to learn autonomously, continuously and collaboratively, organizing and planning tasks over time.

Expected results from this subject

Expected results from this subject	Training and Learning Results			
1.- Know the fundamental principles of the Thermodynamic and know applied to realize global analyses of thermodynamic systems of interest in Sciences of the Sea.	A5	B1	C1	D2
Comprise and know use the relations and *diagramas *termodinámicos that describe the different properties of the substances.		B3	C4	
Know the cycles *termodinámicos basic of thermal machine and *refrigeración and his main applications in Sciences of the Sea.			C5	
Know collaborate in the work with other people of communicative and constructive form in the manufacture of experiments *termodinámicos.				

2.- Resolve problems of theory of fields and equations of the physical-mathematical chords with the paper of the fields in Sciences of the Sea. Argue the resolution of problems by means of it logical scientist and the scientific methodology.	A5	B1 B3	C1 C4 C5	D1 D2
4.- Identify the parameters that characterize a wave. Resolve problems envelope to *propagación of waves and his incidence envelope the means. Know resolve the implications of *emisores or receiving of wave in movement. Know collaborate in the work with other people of communicative and constructive form in the manufacture of one experience of waves.	A5	B1 B3	C1 C4 C5	D1 D2
5.- Determine the physical parameters that define the behaviour of the subject in witnesses of electric fields *y magnetic. Identify the #phenomenon of *inducción electromagnetic. Identify the understanding of the *electromagnetismo through the *invarianza of the *ecuaciones of Maxwell. Identify the parameters that characterize an electromagnetic wave. Resolve problems envelope to *propagación and radiation of electromagnetic waves in distinct means. Distinguish the *particularidades behavioural of the electromagnetic fields. Identify differentiate and basic similarities between electromagnetic wave and acoustic wave/mechanics.	A5	B1 B3	C1 C4 C5	D1 D2
6.- Know and identify the physical properties more *relevantes in the water of the sea so much from a fundamental point of view how to realize oceanographic studios. Be able of *recabar and #analyze the necessary information to carry out *tarear where the physical behaviour of the water of the sea was *relevante.	A5	B1 B3	C1 C4 C5	D1 D2

Contents

Topic	
1.- Thermodynamics	1.- Introduction. Extensive and intensive magnitudes. Definitions. 2.- Thermal balance and zeroth law of thermodynamics. 3.- Heat. capacity and specific heat. Phase change and latent heat. 4.- Thermal exchanges of energy: conduction, convection and radiation. 5.- First law. Internal energy. 6.- The ideal gas. 7.- Heat engine and refrigerator. 8.- Entropy.
2.- Elementary theory of fields	1.- Introduction and concept of field. Types of fields 2.- Gradient of a scalar field. 3.- Circulation of a vector field. 4.- Flow and divergence of a vector field. Gauss' theorem. Solenoidal fields. 5.- Curl of a vector field. Stokes' theorem. Conservative fields.
3.- Basic principles of fluid mechanics	1.- Fluid characterization. Pressure and density. 2.- Fluid statics. Archimedes' principle. 3.- The continuity equation. Bernoulli's equation. 4.- The viscous fluid. 5.- Navier-Stokes' equation. 6.- Energy equation.
4.- Waves	1.- Types of wave. Wave interference. Diffraction, reflection and refraction of waves. 2.- Wave phenomena. 3.- Doppler effect. 4.- Introduction to ocean waves.
5.- Basics of electromagnetism.	1.- Electric charge. Electric field. Magnetic field. Maxwell's laws. 2.- Electromagnetic waves 3.- The spectrum of electromagnetic radiation 4.- Interaction with matter. 5.- The black body radiation. Stefan-Boltzmann's law.
6.- Basic properties of the sea water.	1. Mechanical properties: density, viscosity, surface tension and compressibility. 2. Thermal properties: changes of phase, specific and latent heats, thermal conductivity and thermal dilatation. 3. Electromagnetic properties: conductivity and refraction index.

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practical	15	15	30
Seminars	7	0	7
Lecturing	30	13	43
Problem and/or exercise solving	0	30	30
Report of practices, practicum and external practices	0	15	15

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

Methodologies	
	Description
Laboratory practical	Realización de diversas prácticas de laboratorio en las que el alumnado adquirirá los conocimientos básicos del procedimiento experimental en física, así como el cálculo de incertidumbres en las variables físicas determinadas. La asistencia a las prácticas de laboratorio y la entrega, en tiempo y forma, de la memoria correspondiente es obligatoria para superar la materia en el año en curso.
Seminars	Resolución de diversos ejercicios y problemas relacionados con lo analizado en las sesiones magistrales y que presenten más dudas o que sean de mayor dificultad. Organización del trabajo realizado en el e-portfolio. Se propondrán boletines de problemas que el alumno debe resolver por sí mismo.
Lecturing	Exposición y explicación de los diversos conceptos físicos y de las distintas leyes con las que se relacionan, mostrando la manera de alcanzar los objetivos y haciendo hincapié en aquellos aspectos que resulten más problemáticos y dificultosos y resolviendo distintos ejemplos/problemas. Se propondrán distintas referencias bibliográficas.

Personalized assistance

Methodologies	Description
Seminars	Students willing so could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables to be indicated. To better optimise the procedure, the student is requested to previously contact his/her teacher with reasonable anticipation.
Laboratory practical	Students willing so could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables to be indicated. To better optimise the procedure, the student is requested to previously contact his/her teacher with reasonable anticipation.
Lecturing	Students willing so could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables to be indicated. To better optimise the procedure, the student is requested to previously contact his/her teacher with reasonable anticipation.

Assessment

Description		Qualification	Training and Learning Results
Problem and/or exercise solving	It Will evaluate the assimilation of knowledges of the students with a test based on problems related with the subject. The exam will be developed according to the official calendar: http://mar.uvigo.es/index.php/en/alumnado-actual-2/examen-es-3	40	A5 C1 D1 C4 D2 C5
Report of practices, practicum and external practices	It will qualify the realization of the laboratory experimets and the report in groups of two students. It must be remembered that the attendance at laboratory practices and the corresponding report, in due time and form, is mandatory to approve the matter.	25	A5 B1 C1 D2 B3 C4
Portfolio / dossier	Developing of a "porfolio" based on the subject in groups of two students.	35	A5 B1 C1 D1 B3 C4 D2

Other comments on the Evaluation

Date, time and place of exams will be published in the official web of Marien Sciencies Faculty:
<http://mar.uvigo.es/alumnado/examen-es/>

In the evaluation of the second call, it will be possible to recover the individual written test corresponding to the resolution of problems and/or exercises that will have a weight of 40%, while the "joint" note derived from the rest of the methodologies obtained in the first call will be maintains.

Global assessment option: The application for this evaluation option must be submitted in the time and manner determined by the Center, which will be published prior to the academic year start. Given the experimental nature of the practices, attendance at them is mandatory to be eligible for this evaluation option. Failure to attend the practices, with no justified cause invalidates this possibility, as well as the opportunity for extraordinary evaluation (2nd opportunity). The global evaluation will be carried out through a single exam (75%) on all the contents of the subject. Likewise, the student will have to create and carry out a practice in the physics laboratory (25%) to determine a physical property, analysed in the matter, of a given material.

Students are strongly requested to fulfil a honest and responsible behaviour. It is considered completely unacceptable any

alteration or fraud (i.e., copy or plagiarism) contributing to modify the level of knowledge and abilities acquired in exams, evaluations, reports or any kind of teacher's proposed work. Fraudulent behaviour may cause failing the course for a whole academic year. An internal dossier of these activities will be built and, when reoffending, the university rectorate will be asked to open a disciplinary record.

Sources of information

Basic Bibliography

Young, Freedman, **Física Universitaria**, Pearson, 14ª ed., (2 vols.), 2018

R. A. Serway y J.W. Jewett, **Física para Ciencias e Ingeniería**, Thomson, 9ªEd., 2014

Complementary Bibliography

P.A. Tipler y G. Mosca, **Física para la Ciencia y la Tecnología**, Reverté, 6ª ed., (2 vols.), 2010

Jou, Llebot, Perez, **Física para ciencias de la vida**, McGraw-Hill, 2ª ed., 2008

R.A. Varela y G. Rosón, **Métodos en Oceanografía Física**, Edit. Anthias, 2008

W.E. Gettys, F.J. Keller y M.J. Skove, **Física clásica y moderna**, McGraw-Hill, 1992

A. H. Cromer, **Física para las ciencias de la vida**, Editorial Reverté, Barcelona., 1986

Recommendations

Subjects that it is recommended to have taken before

Physics: Physics I/V10G061V01102

Other comments

The continued use of tutorials is recommended to solve any doubt about the subject, and also to help solve the problems.