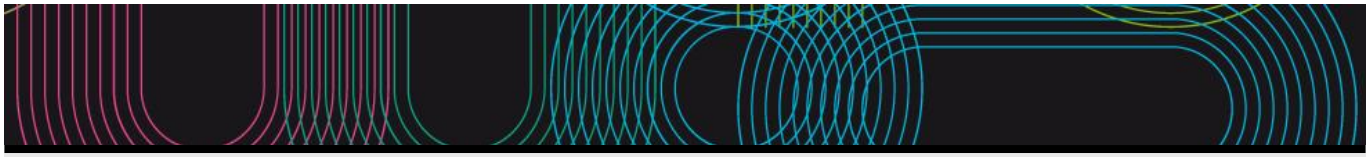

(*)Facultade de Ciencias do Mar

Grado en Ciencias del Mar

Subjects			
Year 1st			
Code	Name	Quadmester	Total Cr.
V10G061V01101	Biology: Biology I	1st	6
V10G061V01102	Physics: Physics I	1st	6
V10G061V01103	Geology: Geology 1	1st	6
V10G061V01104	Mathematics: Mathematics I	1st	6
V10G061V01105	Chemistry: Chemistry I	1st	6
V10G061V01106	Biology: Biology 2	2nd	6
V10G061V01107	Statistics	2nd	6
V10G061V01108	Geology: Geology 2	2nd	6
V10G061V01109	Mathematics: Mathematics II	2nd	6
V10G061V01110	Chemistry: Chemistry 2	2nd	6

IDENTIFYING DATA				
Biology: Biology I				
Subject	Biology: Biology I			
Code	V10G061V01101			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Pasantes Ludeña, Juan José			
Lecturers	Miguel Villegas, Encarnación de Pasantes Ludeña, Juan José			
E-mail	pasantes@uvigo.es			
Web				
General description	Biology I is one of the mandatory subjects in the first semester of the first year of the Degree in Marine Sciences. The basic biological principles of cell biology and genetics are studied, mainly: 1) cell and tissue organisation. 2) development and cell differentiation. 3) transmission and characterization of herditary material. 4) basic aspects of evolution and the origin of species. Theoretical and practical lessons are employed in the teaching program in order the students be familiar with 1) microscopic identification 2) the solving of practical problems in genetics and cell biology. English Friendly subject: International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.			

Training and Learning Results	
Code	
B1	Know and use vocabulary, concepts, principles and theories related to oceanography and apply everything learned in a professional and/or research environment.
B2	Plan and execute surveys in the field and laboratory work, applying basic tools and techniques for sampling, data acquisition and analysis in the water column, sea bottom and marine substratum.
B3	Recognize and implement good practices in measurement and experimentation, and work responsibly and safely both in field surveys and in the laboratory.
B4	Manage, process and interpret the data and information obtained both in the field and in the laboratory.
B5	Develop, implement and write basic or applied projects in oceanography from a multidisciplinary perspective.
C9	Acquire basic knowledge about the structural and functional organization and the evolution of marine organisms.
C11	Apply the knowledge and techniques acquired to the characterization and sustainable use of living resources and marine ecosystems.
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. Define, look for, organize and elaborate works with information of the subject	B1	C9	D1
2. Cooperatively workout exercise resolution	B2	C11	D2
3. Use of telematic tools and other sources for autonomous learning	B3		
	B4		
CELL BIOLOGY	B5		
4. Recognize the diversity and organisation of cells and tissues			
5. Establish relations between cell compartments and cell functions			
6. Differentiate clearly vegetal and animal cell organisation			
7. Establish relationships between cell organisation and cell function			
8. Recognize the types of microscopes associated to the study of cells and tissues.			
9. Morphological identification of the cells and their components.			
GENETICS			
10. Importance of DNA in biology			
11. Apply the scientific method and basic research technologies in Genetics			
12. Learn how to establish genetic hypotheses and strategies to refute them			
13. Manage the basic mechanisms for the transmission of the hereditary material			
14. Know the molecular structurer, the regulation and the expression of the hereditary material			
15. Know the basic genomic principles and their biotechnological applications.			
16. Know the origin of the biological diversity and the evolutionary history of the species			

Contents

Topic	
Cell biology, 1st part. General organisation of the eukaryotic cell	Cell evolution. Endosimbiosis: Evolutionary importance. Similarities and differences of animal and plant cells. Cell membranes: composition. Functional properties. Plasma membrane and cell surface. Cell junctions and cell adhession. Cell communication. Cytoplasm and cell organelles (I): Endoplasmic reticulum, Golgi and lysosomes. Vesicular traffic (II): peroxysomes, mitochondria and cloroplasts. Cytoeskeleron and cell movement. The nucleus: chromatin and chromosomes. The nucleolus.
Cell biology, 2nd part. Bases of embryonic development	Cell cycle: interphase and M phase. Apoptosis. Gametogenesis. Fertilization and development of the zyigote. Cell specialization.
Cell biology, 3rd part. Tissues	Animal tissues. Epithelium: General organisation and function. Conjunctive tissue and derivatives. General organisation. Specialized conjunctive tissues : general characteristics of cartilage, bone and blood. Muscular tissue. Nervous tissue.
Genetics	DNA estructure, organisation, replication, alterations and expression. Mendelian heredity and its variations Liinkage and recombination DNA technologies and their applications

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	39	39	78
Problem solving	6.5	6.5	13
Practices through ICT	6	6	12
Objective questions exam	2	14.5	16.5
Problem and/or exercise solving	0.5	30	30.5

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

Methodologies

	Description
Lecturing	Description, by the teaching staff, of the contents of the study subject, of the theoretical bases and/or the guidelines of the work, the exercise or the project to be developed by the students.
Problem solving	Resolution of genetic exercises.
Practices through ICT	Application of the learned contents to specific situations and acquisition of basic skills and procedures related with the object of study in spaces with specialized equipment (laboratories, computing rooms, etc.).

Personalized assistance

Methodologies	Description

Practices through ICT	The teaching staff will continuously assess the participation of the students along the course. Students who wish it may attend personal tutorials to resolve doubts and/or uncertainties, mainly at the times indicated on the faculty website and/or on the MOOVI platform. To better optimize the procedure, the student is requested to contact the teacher in advance by email, with reasonable anticipation.
Lecturing	The teaching staff will continuously assess the participation of the students along the master sessions and their on-line activities. Students who wish it may attend personal tutorials to resolve doubts and/or uncertainties, mainly at the times indicated on the faculty website and/or on the MOOVI platform. To better optimize the procedure, the student is requested to contact the teacher in advance by email, with reasonable anticipation.
Problem solving	The teaching staff will continuous assess the participation of the students in exercise solving and in the quality of solved exercises. Students who wish it may attend personal tutorials to resolve doubts and/or uncertainties, mainly at the times indicated on the faculty website and/or on the MOOVI platform. To better optimize the procedure, the student is requested to contact the teacher in advance by email, with reasonable anticipation.

Tests	**Description**
Problem and/or exercise solving	The teaching staff will continuous assess the quality of the solved problems, questions and exercices for each student along the semester. Students who wish it may attend personal tutorials to resolve doubts and/or uncertainties, mainly at the times indicated on the faculty website and/or on the MOOVI platform. To better optimize the procedure, the student is requested to contact the teacher in advance by email, with reasonable anticipation.

Assessment

	Description	Qualification	Training and Learning Results		
Lecturing	Final exam: the assesment of the subject Biology I will be performed by means of a written exam. In this exam the theoretical and practical contents will be evaluated by means of test of multiple answers, questions with specific short or long answers, identification and interpretation of figures / images as well as the resolution of genetic problems Final exam. Cellr biology 19 % Genetics 19 %	38	B1 B2 B3 B4 B5	C9 C11	D1 D2
Objective questions exam	Final exam	2	B1 B2 B3 B4 B5	C9 C11	D1 D2
Problem and/or exercise solving	Evaluation will be the result of the assesment of the quality of the resolution of the Genetic problems and exercises (15 %) and the marks obtained in Cell biology (30 %) and Genetics (15 %) questionaries.	60	B1 B2 B3 B4 B5	C9 C11	D1 D2

Other comments on the Evaluation

The final qualification includes:

a) The mark obtained in solving problems, exercise and questionaries along the course (60 %: Cell Biology 30 %, Genetics 30 %). This mark wil be kept for the second oportunity

b) The mark obtained in the first or second oportunity exam (40 %: Cell Biology 20 %, Genetics 20 %).

To pass the subject, a minimum of 2 points in each of the two blocks that compose the subject (Genetics and Cell Biology), and a minimum of 5 points in total, are required. It is also necessary to reach a minimum of 4 points from a total of 10 in the Genetics exam. If those minimums are not reached, the maximum numerical qualification to be reflected in the "acta" will be 4.5.

In case that the final calification do not reach the pass minimum (5 points), but are equal or higher than 2.5 in one of the two blocks (Genetics or Cell Biology), the mark will be kept for the "second edition" (July) if the student is explicity in accordance with it.

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 start.

For students that chose global evaluation, marks will be the result of a single exam (100%)

Date, time and place of exams will be published in theofficial web of Marien Sciencies Faculty:

http://mar.uvigo.es/alumnado/examenes/

The students from previous courses will have to take part in all the programmed activities again.

Students are strongly requested tofulfil a honest and responsible behaviour. It is considered completelyunacceptable any alteration or fraud (i.e., copy or plagiarism)contributing to modify the level of knowledge and abilities acquired inexams, evaluations, reports or any kind of teacher□s proposed work.Fraudulent behaviour may cause failing the course for a whole academicyear. An internal dossier of these activities will be built and, whenreoffending, the university rectorate will be asked to open adisciplinary record

Sources of information

Basic Bibliography

Campbell N. A. & Reece J. B., **1. BIOLOGÍA**, 7ª ed, Panamericana, 2007

Pierce BA, **Genética. Un enfoque conceptual**, 5ª ed, Panamericana, 2015

Complementary Bibliography

Sadava / Heller / Orians / Purves / Hillis, **VIDA La Ciencia de la Biología**, 8ª ed, Panamericana, 2009

Brown TA, **Genomes 4**, 4ª ed, Garland Science, 2017

Schnek,A Massarini, A. Curtis, **Biología**, 7ª ed, Panamericana, 2008

Recommendations

Other comments

The study of the subject in a continuous way will allow the students to take part in active form in the course sylabus. It is recommended to show a real interest in the course, showing a good attitude and demonstrating aptitude in the acquisition of knowledges. The knowing, comprending, thinking and reasoning the basic notions of the subject will be indispensable to take part in the distinct activities proposed by the teaching staff and be evaluated positively.

IDENTIFYING DATA				
Physics: Physics I				
Subject	Physics: Physics I			
Code	V10G061V01102			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	#EnglishFriendly Spanish Galician English			
Department				
Coordinator	Mato Corzón, Marta María			
Lecturers	Mato Corzón, Marta María Souto Torres, Carlos Alberto Varela Benvenuto, Ramiro Alberto			
E-mail	fammmc@uvigo.es			
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 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 enviroment and the development of models related with it. Furthermore, it is important to understand the fundamental physic 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	
A4	Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
B3	Recognize and implement good practices in measurement and experimentation, and work responsibly and safely both in field surveys and in the laboratory.
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.
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	Training and Learning Results			
1. Understand the need of a reference system to describe a movement. Understand the movement and his causes. Identify the different types of movements. Know how graph any observation to.	A4 A5	B3	C4	D1 D2
2. Identify the field of application of classical mechanics. Understand systems of particles and the rigid bodies. Solve mechanical problems using Newton's laws and conservation laws.	A4 A5	B3	C4	D1 D2
3. Understand and use in a quantitative way the concept of energy (non thermal). Recognize the transformations of energy to explain any daily phenomenon. Identify kinetic and potential energy in different situations. Explain and use the conservation of mechanical energy in simple situations. Understand work as a form of energy exchange. Solve problems related with work, power and conservation of mechanical energy. Evaluate the importance of energy saving.	A4 A5	B3	C4	D1 D2
4. Know and understand the basic equations of the kinematics and dynamics of a simple harmonic oscillator, damped harmonic oscillator and driven harmonic oscillator, and the phenomenon of resonance.	A4 A5	B3	C4	D1 D2
5. Know the evolution of the Universe along the history. Know Newton's law of Gravitation, and understand his application to celestial and terrestrial bodies' movements. Understand the relation between the properties of a planet and the weight of a body in his surface.	A4 A5	B3	C4	D1 D2
6. Understand the Earth as a reference system, his movement around the Sun, as well as those of the Moon. Apply that knowledge to explain phenomena like the tides, the different Moon phases, the calendar's stations, etc.	A4 A5	B3	C4	D1 D2
7. To know the basic characteristics of continuous bodies.	A4 A5	B3	C4	D1 D2

Contents	
Topic	
1. Kinematics of particles.	1.1. The position vector and the path. Celerity, velocity and acceleration (medium and instantaneous). 1.2. Intrinsic components of acceleration (normal and tangential) and his interpretation. 1.3. Movement of the particle in space. Analysis of different types of movements. 1.4. Change of the reference system. Relative movement. Translation and rotation of the reference axes. Drag velocity and relative velocity. Drag acceleration and relative acceleration
2. Newtonian dynamics.	2.1. Introduction: Dynamics as a part of physics. 2.2. Dynamics of the particle: Dynamic's principles or Newton's laws of motion. Linear momentum. Mechanical impulse. Linear momentum conservation theorem. Angular momentum and his conservation. Central forces. Dynamics of the circular movement. 2.3. Dynamics of systems of particles: Types of systems; internal and external forces. Centre of mass of a system of particles. Movement of a system of particles. Newton's second law for a system of particles. Linear momentum of a system of particles. Principle of conservation of linear momentum of a system of particles and applications. Angular momentum of a system of particles. Conservation of angular momentum in a system of particles. 2.4. Dynamics of the rigid solid: Dynamics of rotation. Momentum of inertia of rigid body. Calculation of momentums of inertia. Steiner's theorem. Kinetic momentum of rotation. Angular impulse. Conservation principle.
3. Work and energy	3.1. The different forms of energy. Definitions of work, power and energy. 3.2. Mechanical, kinetic and potential energy. Theorem of live forces. Conservation mechanical energy. 3.3. Mechanical, kinetic and potential energy of a system of particles. 3.4. Theorem of live forces and conservation of energy for a system of particles. 3.5. Kinetic rotational energy.
4. Simple harmonic motion.	4.1. The simple harmonic motion. Kinematics of the harmonic oscillator. Representation as rotating vectors. 4.2 Dynamics of the harmonic oscillator and his physical interpretation. Energy of a harmonic oscillator. 4.2. The simple pendulum. 4.3. Notion of forced oscillator. Resonance. 4.4. Fourier analysis of the periodic movement.
5. Gravitation. Applications to the Earth.	5.1. Historical evolution. 5.2. Newton's law of Gravitation. 5.3. Gravitational field and potential on Earth. The local gravitational field. 5.4. Movement of the planets and satellites
6. The Earth as a reference system.	6.1. The movements of the Earth in space. The stations. The phases of the Moon. 6.2. Dimensions and terrestrial coordinates. 6.3. The local reference system. Accelerations of inertia. 6.4. The Coriolis acceleration. 6.5. The centrifugal and terrestrial acceleration. The geopotential. 6.6. Newtonian theory of tides. The tidal ellipsoid.
7. Continuous media	7.1. Introduction, qualitative ranking of the material. 7.2. Elasticity and shear deformation.
LABORATORY	1. TREATMENT OF EXPERIMENTAL DATA. 2. MEASURING INSTRUMENTS. 3. MEASURING THE REACTION TIME. 4. STATIC STUDY OF A SPRING. HOOKE'S LAW. 5. OSCILLATORY MOVEMENTS IN A SPRING. SIMPLE HARMONIC MOTION. 6. STUDY OF THE SIMPLE PENDULUM.

Planning			
	Class hours	Hours outside the classroom	Total hours
Laboratory practical	15	3	18
Lecturing	30	20	50
Seminars	7	30	37

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	Realization of different laboratory experiments with which the students will get basic knowledge in the experimental procedure in physics, as well as in the calculation of the error of a measurement. The attendance to the laboratory and the delivery in time and form of the corresponding report is a must for this subject in the year in course, both in the global assessment option and in the continuous assessment option.
Lecturing	Exhibition and explanation of the diverse physical concepts and his motivation, of the distinct laws with which relate, as well as the demostration of the required theorems. Resolution of some practical examples to support the theoretical explanations.
Seminars	Resolution of different problems related with the theory, doubts and concepts of difficult understanding. Exercises that the student must solve autonomously will be proposed. The attendance at the seminars and the delivery of the proposed exercises is mandatory to pass the subject in the continuous assessment option.

Personalized assistance

Methodologies	Description
Seminars	The teacher will solve any doubts that are presented to the students in solving the problems. Students willing so could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables indicated (Mondays and Tuesdays from 11:00 a.m. to 2:00 p.m.). To better optimise the procedure, the student is requested to previously contact his/her teacher with reasonable anticipation.
Lecturing	The teacher will solve any doubts that are presented to the students in the lecturing. Students willing so could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables indicated (Mondays and Tuesdays from 11:00 a.m. to 2:00 p.m.). To better optimise the procedure, the student is requested to previously contact his/her teacher with reasonable anticipation.
Laboratory practical	The teacher will solve any doubts that are presented to the students in the laboratory about the material used, what is used and how is used correctly, the experimental procedure used, the analysis of results, the necessary computer tools, ... Students willing so could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables indicated (Mondays and Tuesdays from 11:00 a.m. to 2:00 p.m.). 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		
Seminars	There will be a test with problems similar to the ones solved during the seminars' sessions and/or the deliveries of the proposed problems.	30	A4 A5	C4	D1 D2
Problem and/or exercise solving	It will qualify the assimilation of knowledge of the students with a written test with a diversity of problems related to the theory and seminars. A minimum score of 3.5 points over 10.0 will be demanded in this exam to pass the subject.	40	A4 A5	C4	D1 D2
Report of practices, practicum and external practices	It will evaluate the students ability to implement the laboratory procedure, successfully finish the experiments, and elaborate a proper report with all the information required.	30	A4 A5	B3 C4	D1 D2

Other comments on the Evaluation

GLOBAL ASSESSMENT OPTION:

Students who choose the GLOBAL assessment should request it within the period and in the manner stipulated by the Center. This information will be available to all students before the start of the teaching period. To pass the subject, they must complete and pass the Laboratory Practices evaluation (30% of the final mark) with a score equal to or greater than 5 points over 10. In addition, they must achieve at least 5 points out of 10, in a test on all the contents of the subject, which will account for 70% of the final mark, both in the ordinary and in the extraordinary opportunity.
Laboratory: Attendance at laboratory classes is mandatory, therefore in the case of unjustified absences, you will not be entitled to recover this methodology, neither in the global evaluation modality nor in the extraordinary opportunity (July call).

Seminars: In the case of GLOBAL assessment, the 30% corresponding to this methodology will be included in the final test.
Extraordinary oportunity (2nd Opportunity): In the case of continuous assessment, in the official test, only the recovery of the problems exam of the ordinary call can be made (40%). Students who have NOT exceeded 5 points over 10 of the seminars mark and the laboratory practice report, will be able to improve it in the extraordinary opportunity (July call).

Other considerations:
Date, time and place of the official exams will be published in the official web of Marien Sciencies Faculty: http://mar.uvigo.es/alumnado/examenes/

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

M. Alonso y E.J. Finn, **Física, Vol. 1**, Ed.Addison Wesley Iberoamericana, 2000
R. A. Serway y J. W. Jewett, **Física para Ciencias e Ingeniería**, Ed. Thomson, 2005
P. A. Tipler y G. Mosca, **Física para la Ciencia y la Tecnología, Vol. 1**, Ed.Reverté, 2006
S. Burbano de Ercilla, E. Burbano y C. Gracia, **Problemas de Física**, Ed. Tébar, 2006

Complementary Bibliography

Recommendations

Subjects that continue the syllabus

Physics: Physics II/V10G061V01203

Subjects that are recommended to be taken simultaneously

Statistics/V10G061V01107
Mathematics: Mathematics I/V10G061V01104

Other comments

It is recommended to attend and use the tutorial groups to resolve any questions related to the subject, to clarify the concepts of the theory and to help solving problems. The schedule will be Monday and Tuesday from 11:00 a.m. to 2:00 p.m.

IDENTIFYING DATA				
Geology: Geology 1				
Subject	Geology: Geology 1			
Code	V10G061V01103			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Nombela Castaño, Miguel Angel			
Lecturers	Alejo Flores, Irene Diz Ferreiro, Paula Francés Pedraz, Guillermo García Gil, María Soledad Nombela Castaño, Miguel Angel Pérez Arlucea, Marta María			
E-mail	mnombela@uvigo.es			
Web	http://webs.uvigo.es/c10/webc10/ficha.php?id=6			
General description	The Geology I (Internal Geology) pretends that the student purchase in the first *cuatrimestre of the 1*er course of the Degree of Sciences of the Sea, the knowledges on the appearances related with the structure and internal composition of the Earth, as well as of the internal processes, with an approach from the field of the Tectonics of Plates and the Marine Geology. 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	
A1	Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study
A2	Students can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study
B1	Know and use vocabulary, concepts, principles and theories related to oceanography and apply everything learned in a professional and/or research environment.
B4	Manage, process and interpret the data and information obtained both in the field and in the laboratory.
C12	Acquire knowledge about processes and products related to internal and external geological cycles.
D1	Develop the search, analysis and synthesis of information skills oriented to the identification and resolution of problems.
D5	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.

Expected results from this subject	Training and Learning Results			
1. Know the internal structure and composition of the Earth	A2	B1		
2. Know and relate the internal processes with the Plate Tectonic.	A1	B4	C12	
3. Recognise tectonic structures and the processes that generate them.	A1	B4	C12	
4. Handle of representation systems of deformation structures.		B1 B4		D5
5. Know the interpreteison of geological maps.	A2	B1 B4		D1 D5
6. Identify the main minerals and igneous metamorphic and rocks.	A1		C12	D1 D5
7. Skill in the management of the geological information related with the inner geological processes, capacity of synthesis and team work	A1	B4	C12	D1 D5

Contents	
Topic	
Presentation Geology I (Geological Processes Interns)	The **subtemas correspond with the subjects.

Subject 1. Introduction: Origin of the Earth, Principles of the Geology and the Geological Time	The **subtemas correspond with the subjects.
Subject 2. Structure of the Earth and his materials: minerals and rocks	The **subtemas correspond with the subjects.
Subject 3. Units of the Terrestrial Relief-Oceanic Bottoms: types and origin of margins.	The **subtemas correspond with the subjects.
Subject 4. Crust deformation: fragile and ductile	The **subtemas correspond with the subjects.
Subject 5. Plate Tectonics: introduction and mechanisms	The **subtemas correspond with the subjects.
Subject 6. Metamorphism, metasomatism, metamorphic rocks and Plate Tectonic.	The **subtemas correspond with the subjects.
Subject 7. Magmatism, Ígneous rocks and Plate Tectonic.	The **subtemas correspond with the subjects.
Subject 8. Vulcanism and Plate Tectonic.	The **subtemas correspond with the subjects.
Subject 9. Seismicity and Plate Tectonic.	The **subtemas correspond with the subjects.
Subject 10. Synthesis: economic and environmental of the Inner Geological system.	The **subtemas correspond with the subjects

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	0.75	1.75
Lecturing	18	36	54
Seminars	6	24	30
Laboratory practical	13	22.75	35.75
Studies excursion	4.5	9	13.5
Problem and/or exercise solving	1	4	5
Laboratory practice	2	3.5	5.5
Report of practices, practicum and external practices	0.5	1	1.5
Objective questions exam	1	2	3
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies

	Description
Introductory activities	The student will be presented with the way in which the classes will be taught, the form of evaluation, the field trips, the practical classes and the seminars. The agenda will be distributed, as well as the necessary material for practical classes and seminars.
Lecturing	The student will be exposed to the theoretical contents that will be evaluated in a final exam.
Seminars	The stereographic projection will be used to represent data of geological structures. Practical work on types of deformations. Identification of large tectonic structures through geographic representation systems. Introduction to the field trip and use of a geological compass.
Laboratory practical	You will learn to deal with topographic and geological maps, to order rocks and geological processes in time from geological sections. In addition, the student will learn to recognize the most common minerals and types of igneous and metamorphic rocks in nature.
Studies excursion	The student will learn to handle the geological compass, recognize rocks and geological structures in the field, their implications for internal processes, and their applied consequences.

Personalized assistance

Methodologies	Description
Lecturing	The student may be assisted both during master sessions, if it does not significantly affect their development, and during tutorial hours (Monday, Tuesday and Wednesday from 12:00 to 14:00). To optimize time, it is necessary for students to contact the teacher sufficiently in advance.
Introductory activities	The student may be assisted during the introductory activities, if it does not significantly affect their development, such as during tutorial hours (Monday, Tuesday and Wednesday from 12:00 to 14:00). To optimize time, it is necessary for students to contact the teacher sufficiently in advance.
Seminars	The student may be assisted both during the seminars, if it does not significantly affect their development, and during tutorial hours (Monday, Tuesday and Wednesday from 12:00 to 14:00). To optimize time, it is necessary for students to contact the teacher sufficiently in advance.
Laboratory practical	The student may be assisted both during practices, if it does not significantly affect their development, and during tutorial hours (Monday, Tuesday and Wednesday from 12:00 to 14:00). To optimize time, it is necessary for students to contact the teacher sufficiently in advance.

Studies excursion	The student may be assisted both during field practices, if it does not significantly affect their development, and during tutorial hours (Monday, Tuesday and Wednesday from 12:00 to 14:00). To optimize time, it is necessary for students to contact the teacher sufficiently in advance.

Tests	**Description**
Problem and/or exercise solving	The student may be assisted both during the seminars, if it does not significantly affect their development, and during tutorial hours (Monday, Tuesday and Wednesday from 12:00 to 14:00). To optimize time, it is necessary for students to contact the teacher sufficiently in advance.
Laboratory practice	The student may be assisted both during practices, if it does not significantly affect their development, and during tutorial hours (Monday, Tuesday and Wednesday from 12:00 to 14:00). To optimize time, it is necessary for students to contact the teacher sufficiently in advance.
Report of practices, practicum and external practices	The student may be assisted both during field practices, if it does not significantly affect their development, and during tutorial hours (Monday, Tuesday and Wednesday from 12:00 to 14:00). To optimize time, it is necessary for students to contact the teacher sufficiently in advance.
Objective questions exam	The student may be assisted both during master sessions, if it does not significantly affect their development, and during tutorial hours (Monday, Tuesday and Wednesday from 12:00 to 14:00). To optimize time, it is necessary for students to contact the teacher sufficiently in advance.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	Attendance to theoretical classes will be evaluated with up to 0.5/10 if at least 85% attend.	5	A1	B1 B4	C12	D5
Problem and/or exercise solving	Given its experimental nature, attendance at the seminars is mandatory. Both the quality of the deliverables and the attitude (participation, involvement, etc.) will be evaluated. Deliverables will be made at the end of each seminar.	15	A1 A2			D1 D5
Laboratory practice	Given its experimental nature, attendance at laboratory practices is mandatory. Both the quality of the deliverables and the attitude (participation, involvement, etc.) The deliverables will be made at the end of each laboratory practice session.	30	A2	B1 B4		D1
Report of practices, practicum and external practices	Given the experimental nature, attendance at study outings is mandatory. Both the quality of the deliverable and the attitude (participation, involvement, etc.) will be evaluated. The deliverable will be made at the end of the study exit.	10	A2	B1 B4	C12	
Objective questions exam	The knowledge acquired in the lectures will be evaluated with short questions, and/or multiple choice questions, and/or true/false type questions. In order to add the rest of the tests, in the exam you have to have at least a 3.5/10. In order to take the exam, attendance at theoretical classes must be at least 50%	40	A1	B1 B4	C12	D5

Other comments on the Evaluation

The course evaluation system will be continuous evaluation, in which the following items will be valued: class attendance (5%); seminars (15%); laboratory practices (30%); leaving studies (10%); exam (40%).

Given the experimental nature of the subject, it is considered that attendance at at least 80% of the practices, seminars and study trips is mandatory to acquire the learning results of the subject, whatever the opportunity (ordinary and extraordinary) and/or the system of study. assessment (continuous or global). Therefore, if said assistance is not met, the subject cannot be passed.

In order to average the exam grade, the minimum grade in Problem Solving and/or Exercises; Laboratory practices; and Internship Report, Practicum and External Practices must be 5/10. In the same way, to be able to add the rest of the tests, in the exam you have to have at least a 3.5/10.

Students who have not passed the subject in the 22/23 academic year will not be obliged to repeat, during the 23/24 academic year, the laboratory practices, seminars and study trips, keeping the grade.

The application for the Global Assesment option must be submitted in the time and manner determined by the Center, which will be published prior to the academic start.

For communications with teachers, the use of the "messaging" of the MooVi platform is recommended, in addition to the use

of the institutional email account (@alumnos.uvigo.es)

The students of the University Program for the Elderly of the University of Vigo who choose this subject within the Integration cycle in order to pass it will have to attend at least 80% of the master sessions as well as at least 80% of the rest of the methodologies employed (seminars, laboratory practices and field practices). On the other hand, the degree of integration with the students of the degree will be valued.

During classes, the use of mobile phones will not be allowed except for activities exclusively related to the subject.

Other considerations

The date, time and place of the evaluation tests will be published on the official website of the Faculty of Marine Sciences:

http://mar.uvigo.es/alumnado/examenes/

S*tudents who take this subject are required to behave responsibly and honestly. Any form of fraud (copying or plagiarism) aimed at distorting the level of knowledge and skills achieved in any type of test, report or work will be considered inadmissible. Fraudulent conduct may mean failing the subject for a full course. An internal record of these actions will be kept so that, in case of recidivism, request the opening of a disciplinary file to the rector.*

Sources of information

Basic Bibliography

Leeder, M.R., Pérez Arlucea, M., **Physical processes in Earth and Environmental Sciences**, Blackwell Publishing, 321 pp,

Tarbuck, E.J., Lutgens, F.K., **Ciencias de la Tierra. Una introducción a la Geología Física**, 10th Edition. Prentice Hall. Madrid. 710 pp.,

Tarbuck, E.J., Lutgens, F.K., **Ciencias de la Tierra. Una introducción a la Geología Física**, 10th Edition 2013,

Frisch, W., Meschede, M. & Blakey, R.C., **Plate Tectonics: continental drift and mountain bulding.**, Springer Science & Business Media, 2010

Complementary Bibliography

Anguita, F., Moreno, F., **Procesos Geológicos Internos.**, Editorial Rueda.,232 pp,

Azañón, J.M., Azor, A., Alonso, F.M., Orozco, M., **Geología Física.**, Paraninfo & Thomson Learning, 302 pp,

Davies, G. H., Reynolds, S.J., **Structural Geology, of rocks and regions**, 3rd Edition. John Willey and Sons, Inc, New York, 776 pp,

Kearey, P., Vine, F., **Global Tectonics**, 3rd Edition. Blackwell Science, 333 pp,

Monroe, J.S., Wicander, R., Pozo, M., **Geología.Dinámica y evolución de la Tierra.**, Ed. Paraninfo, Madrid,

Wicander, R., Monroe, J.S., **Historical Geology. Evolution of Earth and Life Through Time**, 7th Edition. Edit.Brooks/Cole, 580 pp,

Recommendations

IDENTIFYING DATA

Mathematics: Mathematics I

Subject	Mathematics: Mathematics I			
Code	V10G061V01104			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	#EnglishFriendly Galician			
Department				
Coordinator	García Cutrín, Francisco Javier Alonso Álvarez, José Nicanor			
Lecturers	Alonso Álvarez, José Nicanor García Cutrín, Francisco Javier			
E-mail	jnalonso@uvigo.es fjgarcia@uvigo.es			
Web	http://moovi.uvigo.gal			
General description	Mathematics I, in the degree of Grao in Sciences of the Sea, has as primary function to provide students with language, skills and basic mathematical techniques that will require both training and non-professional. In addition, it should contribute to develop logical reasoning for problem solving, data analysis skills, interpretation of results and synthesis of conclusions. Participation, collaboration and a critical spirit will be encouraged. The understanding and management of the fundamental concepts and techniques of linear algebra and calculus will be sought, as well as its application to various areas of study of the marine environment. 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	
A1	Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study
A2	Students can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study
A3	Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues
A4	Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
C1	know at a general level the fundamental principles of sciences: Mathematics, Physics, Chemistry, Biology and Geology.
C2	Acquire basic knowledge of mathematics (differential and integral calculation) and statistics.
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.
D3	Understanding the meaning and application of the gender perspective in different fields of knowledge and in professional practice with the aim of achieving a more just and equal society.
D4	Ability to communicate orally and in writing in Galician language.
D5	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.

Expected results from this subject

Expected results from this subject	Training and Learning Results		
Handle with ease techniques for calculating eigenvalues of a square matrix and determining the sign of a quadratic form. Solve problems in which it is necessary to apply the techniques above.	A1 A2 A3 A4 A5	C1 C2	D1 D2 D3 D4 D5

Understand some basic concepts of differential calculus: partial derivatives, continuously differentiable function, chain rule, implicitly defined function, extreme/optimal of scalar functions.	A1 A2 A3 A4 A5	C1 C2	D1 D2 D3 D4 D5
Use the mechanics of calculating partial derivatives of any order, applying the chain rule, deriving implicitly defined functions, as well as techniques for calculating optimal/extremes with and without equality constraints. Apply the previous techniques to solve optimization problems.	A1 A2 A3 A4 A5	C1 C2	D1 D2 D3 D4 D5
To know the primitives of elementary functions and the main techniques to calculate these. Understand the mechanics of calculating double integrals.	A1 A2 A3 A4 A5	C1 C2	D1 D2 D3 D4 D5
Handle the mechanics of calculation of primitives and double integrals of simple functions. Know how to apply integral calculus to determine areas, volumes, centers of gravity, moments of inertia, etc.	A1 A2 A3 A4 A5	C1 C2	D1 D2 D3 D4 D5
Use a symbolic calculation computer program to solve problems related to the subject.	A1 A2 A3 A4 A5		D1 D2 D3 D4 D5

Contents

Topic	
Matrix calculus	Operations with vectors in the plane and in space. The vector space Rn. Matrices and determinants. Basic operations with matrices and determinants. Discussion and resolution of systems of linear equations.
Differential calculus	Introduction to the functions of several variables. Differentiable functions. Chain rule. Implicit derivation. Extremes and conditional extremes of scalar functions.
Integral calculus.	Riemann integral. The fundamental theorem of integral calculus. Application to the calculation of areas.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	26	52	78
Problem solving	16	32	48
Practices through ICT	4	8	12
Essay questions exam	6	6	12

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

Methodologies

	Description
Lecturing	Exposure of the theoretical bases and orientation, by the teaching staff, on the contents of the subject.
Problem solving	Activities focused on work on a specific topic, which allow deepening or expanding the contents of the discipline. They will be used as a complement to the theoretical classes.
Practices through ICT	Use of a scientific calculator to help solve the exercises proposed in the seminars and master sessions. They take place in computer classrooms.

Personalized assistance

Methodologies	Description
Problem solving	Students who wish may attend personal tutorials to resolve doubts, mainly at the times indicated on the faculty website and/or on the MOOVI platform. In order to better optimize the procedure, the student is requested to contact the teacher in advance by email, with reasonable notice.
Practices through ICT	Students will demand from the teachers the clarifications they deem appropiate to better understand the subject and successfully carry out the proposed tasks. The individual work of the student will also be monitored.

Assessment					
	Description	Qualification	Training and Learning Results		
Problem solving	Test that will consist of theoretical questions and exercises that the student will answer by organizing and presenting, in an extensive way, the knowledge they have on the subject. There will be three tests, each counting 20 percent of the grade.	60	A1 A2 A3 A4 A5	C1 C2	D1 D2 D3 D4 D5
Practices through ICT	Test in which students must solve some exercises using the computer program used in the classroom.	5	A5		D1
Essay questions exam	It will be carried out as part of a final test that will take place at the end of the course, and will have a value of 35 percent of the final grade.	35	A1 A2 A3 A4 A5	C1 C2	D1 D2 D3 D4 D5

Other comments on the Evaluation

Students who do not wish to follow the subjet regularly may choose the global assessment option. The request for this option must be submitted at the time and in the manner determined by the Center, which will be published prior to the academic start. In the case of opting for the global evaluation, all the matter will be evaluated in a single test that will correspond to 100% of the final grade.

For the second opportunity, the students who follow the continuous evaluation will maintain the qualification obtained in it. For the remaining students, the test will correspond to 100% of the final grade.

2nd Opportunity: Students who follow the continuous assesment will mantein the grade obtained in it. For the remaining students the test will correspond to 100% of the final grade.

The date, time and place of the evaluation tests will be published on the official website of the Faculty of Marine Sciences: http://mar.uvigo.es/alumnado/examenes/

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

Besada, M.; García, F.J.; Mirás, M.A.;Quinteiro, C.; Vázquez, C., **Un mar de matemáticas**, 2016

Larson, R.; Hostetler, R. e Edwards, B. H., **Cálculo (volumes I e II)**, MacGraw Hill, 2000

Complementary Bibliography

Adams, R.A., **Cálculo**, Pearson, 2009

Besada, M.; García, J.; Mirás, M.; Quinteiro, C. e Vázquez, C., **Matlab: todo un mundo**, 2007

Besada, M.; García, J.; Mirás, M. e Vázquez, C., **Cálculo diferencial en varias variables**, Garceta, 2011

Besada, M.; García, J.; Mirás, M.; Quinteiro, C. e Vázquez, C., **Matemáticas para Química**, 2008

Recommendations

Subjects that continue the syllabus

Mathematics: Mathematics II/V10G061V01109

IDENTIFYING DATA				
Chemistry: Chemistry I				
Subject	Chemistry: Chemistry I			
Code	V10G061V01105			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Estévez Guiance, Laura			
Lecturers	Alonso Gómez, José Lorenzo Hermida Ramón, José Manuel Losada Barreiro, Sonia Pérez Lorenzo, Moisés			
E-mail	lestevez@uvigo.es			
Web				
General description	The subjet Chemical I enters the students of first course of the Degree in Marine Sciences in the basic concepts of the intermolecular interactions, the chemical thermodynamics, the chemical equilibria, the chemical kinetics and a introduction to the chemical reactivity and to the organic chemistry. 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	
A1	Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
B3	Recognize and implement good practices in measurement and experimentation, and work responsibly and safely both in field surveys and in the laboratory.
B4	Manage, process and interpret the data and information obtained both in the field and in the laboratory.
C1	know at a general level the fundamental principles of sciences: Mathematics, Physics, Chemistry, Biology and Geology.
C6	Acquire the fundamentals and terminology of chemical 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	Training and Learning Results			
- Chemical Nomenclature.	A1 A5	B4	C1 C6	D1 D2
- Achieve the basic rules of laboratory working, as well as the risks associated to handle dangerous chemical substances.	A5	B3 B4	C6	D1 D2
- Calculation of concentrations of solutions.	A1 A5			
- Identify chemical reactions of interest in the marine medium.	A1 A5			
- To predict the properties of substances in function of the present intermolecular forces.	A1 A5			
- Definition of concepts such entalphy, standard entalphy, calorimetry, heat of dissolution and heat of reaction, and their calculation.	A1 A5			
- Know how to use the expressions of the chemical balances to calculate the distribution of the substances involved in them. Know the factors that affect the balance and use the Le Chatelier principle.	A1 A5			
- Definition of pH and pOH, acidity/basicity constant, constants, hidrólisis constnt, and their calculatión.	A1 A5			
- Learn about buffer solutions and the different types of acid-base reactions and know how to use them.	A1 A5			

- Definition of concepts such solubility and product of solubility, and know as if they calculate.	A1 A5
- To know what a oxidation-reduction process is, to define REDOX potential, standard potentials, and to know how they are calculated.	A1 A5
- Understand the principles of operation of an electrochemical cell and predict the products of a electrochemical.	A1 A5
- To define reaction rate and rate equation, and know how to use.	A1 A5
- Learn and know how to use the main methods of analysis of kinetic data.	A1 A5
- To calculate the effect of the temperature in the reaction rate.	A1 A5
- To know the general characteristics of catalysis and their types.	A1 A5
- Differentiate between chemically-controlled reactions and diffusion-controlled reactions.	A1 A5
- Know the functional groups describing the structure of the organic molecules and their reactivity.	A1 A5

Contents

Topic	
Thermochemistry	Internal energy. Heat, work and first principle of thermodynamics. Enthalpy, standard enthalpy. Measure of heats of reaction: Calorimetry. Entropy and Gibbs energ.
Chemical Equilibrium in Gas Systems	Chemical equilibrium. Equilibrium constant. Temperature dependence of equilibrium constant. Altering equilibrium: Le Châtelier principle.
Acid- Base Equilibrium	Theories of acids and bases. Scale of pH. Strong and weak acids and bases. Acid-base Equilibrium. Reactions of hydrolisys. Buffer solutions. Acid-Base reactions. Acid-Base titrations.
Solubility Equilibrium	Solubility and solubility product constant. Altering solubility equilibrium: Common-ion effect. Equilibria involving complex ions.
Redox Processes	Adjustment of redox equations. Redox Equilibrium. Thermodynamics of redox reactions: The Nernst equation. Standard electrode potentials. Galvanic cells. Electrolytic cells
Chemical Kinetics	Reaction rate. Rate equation. Analysis of kinetic data. The effect of the temperature on reaction rates. Catalysis.
Intermolecular Forces	Molecular geometry and polarity. Types of intermolecular forces: Electrostatic forces, inductive forces, dispersion forces, hydrogen bonding. Some properties of liquids.
Introduction to Organic Chemistry	Functional groups. Structure and reactivity. Basic stereochemistry: chirality and configurational stereochemistry.
Laboratory Practices	Application of the experimental techniques related to the subjet. Implementation in the laboratory of the knowledge acquired in themes of thermochemistry, chemical equilibrium and chemical kinetics.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	26	0	26
Seminars	14	20	34
Laboratory practical	12	12	24
Essay questions exam	0	18	18
Objective questions exam	0	10	10
Essay questions exam	0	38	38

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

Methodologies

	Description
Lecturing	They will consist of the exposition of the fundamental aspects of each topic by the teacher, based on the material available on the e-learning platform. In addition to the exposition of topics, numerical problems will also be formulated to help to understand and establish the concepts.

Seminars	The seminar classes will be devoted primarily to problem solving and, when necessary, to delve into the aspects of the topics that present greater difficulties to the students. In the seminar sessions, the teacher may propose problems or exercises that the students must solve individually and submit to the teacher for evaluation. Attendance will be positively valued.
Laboratory practical	Performance, under the supervision of the teacher but autonomously, of laboratory practices related to the subject. The practices will be carried out in pairs. Before starting, the students will have, in the corresponding platform, the scripts of the practices. The script will present the essential elements to carry out the practice at experimental level, as well as the basic points of its theoretical basis and data processing. At the end of the practicals, an evaluation will be carried out by means of a written test, delivery of a report and/or oral test according to the teacher's criteria. Attendance to the practical sessions IS MANDATORY.

Personalized assistance

Methodologies	Description
Lecturing	Those doubts/questions of the students that may arise along the course concerning the classes of theory will be solved in the tutoring schedule. The preferential modality for the tutoring will be a mixed model decided by the student and teacher. The student will have to request an appointment with the professor to arrange the date, hour, and method (virtually or on-site).
Laboratory practical	Those doubts/questions of the students that may arise along the course concerning the laboratory practices or the preparation of the corresponding reports will be solved in the tutoring schedule. The preferential modality for the tutoring will be a mixed model decided by the student and teacher. The student will have to request an appointment with the professor to arrange the date, hour, and method (virtually or on-site).

Assessment

	Description	Qualification	Training and Learning Results
Seminars	For each subject or block of subjects, the estudiantado, of individual form, will resolve a problem or exercise, to proposal of the *profesorado, that will deliver to be evaluated. It will value the assistance.	15	A1 C1 D1 A5 C6 D2
Laboratory practical	It marks here together with the effort and the attitude, the skills and the competitions developed by the student during the realisation of the distinct practical. The assistance the sessions of practices is compulsory and, therefore, is not possible to approve the matter in the case of not to have made. - It remains to criterion of the educational make an evaluation by means of an oral proof and/or written the last day of practices.	15	A1 B3 C1 D1 A5 B4 C6 D2
Essay questions exam	First test. The date of the test will be agreed with the students, as far as possible, but always after the completion of topic 2. The evaluation will be based on theory questions and the resolution of exercises.	15	A1 C1 D1 A5 C6 D2
Objective questions exam	Self-assessment tests that students must solve individually, through the MOOVI platform.	15	A1 C1 D1 A5 C6 D2
Essay questions exam	Second test to be taken on the date of the official exam. The contents evaluated will be all the contents of the subject. The evaluation will be based on theory questions and the resolution of exercises.	40	A1 C1 D1 A5 C6 D2

Other comments on the Evaluation

In order to pass the subject, **it is essential to attend the practical sessions and to achieve a minimum grade of 5.0 points out of 10 in the second test**. If this score is not reached, the grade that will be reflected in the minutes will be only the grade of this exam, not counting any of the other sections.
The overall grade will be the weighted sum of the tests (55%), the laboratory practices (15%), the self-evaluation tests (15%) and the Seminars (15%). The computation of the evaluable methodologies: laboratory practices (15%), self-evaluation test (15%) and Seminar (15%) will be effective as long as a minimum score of 3.5 points is obtained in each of them.
The completion of any evaluable test will imply the condition of "presented" and, therefore, the assignment of a grade according to what is stated in this teaching guide.

Second Round:

For the evaluation in the second call, the percentages of the laboratory practices, tests and Seminar will be maintained. The exam in this call will be weighted 55%. In order to pass the subject in this call, it will be necessary to obtain a minimum qualification of 5.0 points out of 10 in the exam, in which all the contents of the subject will be evaluated.

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 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). To pass the subject, they must complete and pass the Laboratory Classes evaluation (15% of the final mark) with a score equal to or greater than 4.0 points over 10. In addition, they must achieve at least 5.0 points out of 10, in a test on all the contents of the subject, which will account for 85% of the final mark, both in the ordinary and in the extraordinary opportunity.

Other considerations:

It considers inadmissible any form of fraud (i.e. copies and/or plagiarism) directed to *falsear the level of knowledge or skill reached in any type of proof, report or work. The fraudulent behaviours will be able to suppose suspend the matter during a complete course. It will carry an internal register of these performances for, in case of *reincidencia, request to the rectorship the opening of a disciplinary file.

Sources of information

Basic Bibliography

PETRUCCI R.H., **Química General**, (11ª edición), Ed. Pearson Educación, 2017

CHANG, R., GOLDSBY, K. A., **Química**, (12ª edición), Ed. McGraw-Hill, 2016

Complementary Bibliography

LÓPEZ CANCIO, J.A., **Problemas de química**, (1ª edición), Ed. Prentice-Hall, 2000

Peter Atkins, Loretta Jones, **Química. La ciencia central**, (12ª edición), Pearson Educación, 2014

RILEY, J.P., CHESTER, R., **"Introducción a la Química Marina"**, (1ª edición), Ed. A.G.T, 1989

Recommendations

Subjects that continue the syllabus

Chemistry: Chemistry 2/V10G061V01110

Subjects that are recommended to be taken simultaneously

Physics: Physics I/V10G061V01102
Mathematics: Mathematics I/V10G061V01104

Other comments

Stoichiometry, basic laws , different forms to express the concentration and basic chemical nomenclatura will be used very often resolving numerical problems and can be considered fundamental tools in this subject.

IDENTIFYING DATA				
Biology: Biology 2				
Subject	Biology: Biology 2			
Code	V10G061V01106			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Souza Troncoso, Jesús			
Lecturers	López Pérez, Jesús Souza Troncoso, Jesús			
E-mail	troncoso@uvigo.es			
Web				
General description	It is the first approach of the student to the Zoology and Ecology. 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	
A1	Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study
C9	Acquire basic knowledge about the structural and functional organization and the evolution of marine organisms.
C10	Know the biological diversity and functioning of marine ecosystems.
C11	Apply the knowledge and techniques acquired to the characterization and sustainable use of living resources and marine ecosystems.
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	Training and Learning Results		
1. Know, comprise, measure and value the importance of the biodiversity of the organisms in the half marine.	A1	C9 C10 C11	D1 D2
2. Comprise the bases of the diversity and the evolutionary history of the animal species.	A1	C9 C10 C11	D1 D2
3. Know the basic terminology of the zoological science.	A1	C9 C10 C11	D1 D2
5. Know the situation of the *filos zoological in the marine ecosystems (*zooplancton, *necton, *bentos).	A1	C9 C10 C11	D1 D2
6. Know the adaptations *morfolóxicas that condition the situation of the zoological groups in the marine ecosystems coastlines, *neríticos and deep.	A1	C9 C10 C11	D1 D2
7. Know recognize the main *filos zoological belonging to the half marine.	A1	C9 C10 C11	D1 D2
8. Know recognize the offshore species more common.	A1	C9 C10 C11	D1 D2
9. Know and comprise the basic ecological principles that determine the structure and the operation of the marine ecosystems.	A1	C9 C10 C11	D1 D2
10. Acquire basic knowledge on autoecoloxía. Adjustment go in the organisms and the environment. Environmental factors. Analysis of the effects and answers of the organisms the distinct Factors. Conditions and resources.	A1	C9 C10 C11	D1 D2

11. Purchase the capacity to relate processes *abióticos and *bióticos in the half marine.	A1	C9 C10 C11	D1 D2
12. Purchase skill in the analysis and interpretation of data.	A1	C9 C10 C11	D1 D2
13. Purchase the skill to transmit information of form written, verbal and graphic.	A1	C9 C10 C11	D1 D2

Contents	
Topic	
The diversity of the marine organisms. The tree of life.	The zoological Topic coincides with Sub-topics.
The five kingdoms. Unicellular and multicellular organisms.	idem
The multicellular organisms: the animal kingdom.	idem
Origin of metazoas, levels of organisation. Analogy and homology. The symmetry. Classifying animals. The biological nomenclature. Systematics. Filogeny.	idem
Introduction to the Phyla on marine environment.	idem
The invertebrates protostomes. Lophotrochozoa and ecdysozoa.	idem
The invertebrates deuterostomes: xenoturbellida, equinodermata and hemichordata.	idem
Introduction to the Phylum chordata. Characteristics of the subphyla urochordata and cephalochordata.	idem
The subphylum Craniata (vertebrates). Agnatha and gnathostomata.	idem
Marine condrichthyes, osteichthyes, birds and mammalia.	idem
- Vertebrates with accidental presence on marine environment: amphibia and reptilia.	idem
- Field of study of the ecology: The biological macroscopic systems: The ecology how science of synthesis; historical review. Levels of organisation; hierarchy and emergent properties. General theory of systems. System to level supra organismic. The ecosystem. The parts (diversity) and it all (energetic).	The ecological topics coincides with Sub-topics.
- The paper of the environment in the evolution of the organisms: Adaptation; concept and critical. Biological efficacy. Natural selection and genetic drift. Speciation. Convergences and parallelisms. Ecotypes and genetic polymorphisms.	idem
- Decomposition of the environment factors: conditions and resources. Limiting factors. Limits of tolerance and optimal physiological. Ecological indicators. Ecological niche. Ecological profiles.	idem
- Environmental factors: The space, Temperature, Salinity, luminous Radiation, Nutrients, Gases dissolved, others.	idem

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	29	59	88
Seminars	7	24	31
Laboratory practical	8	12	20
Studies excursion	6	3	9
Objective questions exam	0.5	0	0.5

Essay questions exam	0.5	0	0.5
Presentation	0.5	0	0.5
Laboratory practice	0.5	0	0.5

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

Methodologies

	Description
Lecturing	Explain to the students the theoretical contents that will be evaluated in a final examination.
Seminars	By means of the preparation of oral exhibitions on scientific texts selected, the students will show his skills, the team work, oral exhibition regard a scientific subject. After the exposure we will open a debate to evaluate the capacity of synthesis and the understanding of the subject proposed.
Laboratory practical	Recognize the answers of the organisms to the environmental factors. Besides to recognize the most commons marine organisms on our coasts.
Studies excursion	The students will learn to recognize the marine organisms more common of the European coasts.

Personalized assistance

Methodologies	Description
Lecturing	Students willing so could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables indicated. To better optimise the procedure, the student is requested to previously contact his/her teacher with reasonable anticipation.
Seminars	It Will do a continuous assessment of the academic performance of the student during the Seminars by means of the observation of the his active participation, so much during the phase of preparation, manufacture, exhibition, back debate as well as the resources to bibliography used.
Laboratory practical	The professors of the subject will realize a continuous assessment of the performance of the student, in base to the participation in the practices and to the intervention in the distinct activities offered.
Studies excursion	Students willing so could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables indicated. To better optimise the procedure, the student is requested to previously contact his/her teacher with reasonable anticipation.
Tests	**Description**
Objective questions exam	The professor will be present at the exam.
Essay questions exam	The professor will be present at the exam.
Presentation	The professor will be present at the exposition.
Laboratory practice	The professor will be present at the laboratory.

Assessment

	Description	Qualification	Training and Learning Results		
Lecturing	They Will evaluate the contents with questions type test and/or short questions.	2	A1	C9 C10 C11	D1 D2
Seminars	It Will qualify the preparation of the subject and his exhibition. It will evaluate the participation debate us of all the Seminars. Due to the experimental nature, attendance is mandatory.	5	A1	C9 C10 C11	D1 D2
Laboratory practical	It Will value the realization and participation in the practical. Due to the experimental nature, attendance is mandatory.	10	A1	C9 C10 C11	D1 D2
Studies excursion	It Will evaluate the realization and the participation in the trip. Due to the experimental nature, attendance is mandatory.	5	A1	C9 C10 C11	D1 D2
Objective questions exam	It will qualify the basic concepts in Zoology and Ecology.	19	A1	C9 C10 C11	D1 D2
Essay questions exam	It will qualify the basic concepts in Zoology and Ecology.	19	A1	C9 C10 C11	D1 D2
Presentation	Attendance is mandatory during the seminar to give the presentation. It will qualify the presentation and discussion.	15	A1	C9 C10 C11	D1 D2
Laboratory practice	Attendace is mandatory to prepare the results book. It will qualify the laboratory results book.	25	A1	C9 C10 C11	D1 D2

Other comments on the Evaluation

Continuous assesment: Master class/Lecturer attendance: 0.2 points. Exam: 3.8 points. Seminars and technical visit: 3 points. Practices: 3 points.

Global assessment: The application for this evaluation must be submitted in the time and manner determined by the Center, which will be published prior to theacademic start. Given the experimental nature of the practices, attendance at them is mandatory to be eligible for this evaluation option. Failure to attendthe practices, with no justified cause invalidates this possibility, as well as the opportunity for extraordinary evaluation (2nd opportunity).

2nd Opportunity (July call)

Students will be able to recover up to a maximun of 4 points in the 2nd chance exam.

Date, time and place of exams will be published in the official web of Marine SciencesFaculty:

http://mar.uvigo.es/alumnado/examenes/

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

Susan Keen, Jr. Hickman, Cleveland, Allan Larson, David Eisenhour, Helen I'Anson, **Integrated Principles of Zoology**, 16, McGraw-Hill Education, 2015

Richard C. Brusca, **Invertebrates**, Sinauer, 2016

Peter Castro, Michael Huber, **Marine Biology**, 9, McGraw-Hill Higher Education, 2012

Trigo, J.E., et al., **Guía de los Moluscos Marinos de Galicia**, 1, UVIGO - Soc. Esp. Malcologia, 2018

Complementary Bibliography

Recommendations

Other comments

The key to sucssess is took part in all activities.

IDENTIFYING DATA				
Statistics				
Subject	Statistics			
Code	V10G061V01107			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	1st	2nd
Teaching language	#EnglishFriendly Galician			
Department				
Coordinator	Rodríguez Álvarez, María José			
Lecturers	Rodríguez Álvarez, María José			
E-mail	mxrodriguez@uvigo.es			
Web				
General description	Subject destined to the knowledge and use of the fundamental statistical techniques for the treatment of and analysis of experimental data. 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	
A2	Students can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study
A3	Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues
A4	Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
B2	Plan and execute surveys in the field and laboratory work, applying basic tools and techniques for sampling, data acquisition and analysis in the water column, sea bottom and marine substratum.
B4	Manage, process and interpret the data and information obtained both in the field and in the laboratory.
C2	Acquire basic knowledge of mathematics (differential and integral calculation) and statistics.
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	Training and Learning Results			
Know the importance of information and be able to assess and classify it in each decision area.	A2	B2	C2	D1
Know how to correctly apply and interpret the basic descriptive techniques for the analysis of unidimensional and bidimensional variables.	A3 A4 A5	B4		D2
Understand the concept of hypothesis testing.	A3 A5		C2	D1 D2
Understand the principles of multivariate analysis.	A3 A5		C2	D1 D2
Effectively solve problems and issues of each of the lessons using the appropriate quantitative method.	A5	B2		D1 D2
Introduce the students in the manage of computer packages related to statistics: R and RStudio. And so favor a positive attitude towards the quantitative methods, in general, and statistics, in particular, as well as their computer manipulation.	A3 A5	B2 B4		D1 D2
Understand the importance of statistical analysis when taking decisions and learn when to apply each technique and interpret the results obtained.	A3 A4	B2		D1 D2
To awaken the taste for the use and study of statistics, seeing it as a tool that allows us to learn more about our own field of knowledge and to start carrying out our own research.	A3 A5			D1 D2

Contents	
Topic	
1. Introduction to statistics. Basic concepts.	Population. Individual. Sample. Random variable. Types of variables: qualitative and quantitative. Descriptive and inferential statistics.

2. Descriptive statistics and exploratory data analysis.	- One-dimensional case: frequency distribution. Measures of location (mean, median, mode and quantiles), dispersion (range, interquartile range, standard deviation and variance) and shape (skewness). - Two-dimensional case: double-entry frequency tables. Correlation. Measures of centralization and dispersion by subgroups. - One-dimensional and two-dimensional graphical representations.
3. Introduction to probability theory, random variables and main probability distributions.	Basic concepts: sample space, events and elementary events, basic rules of probability, main probability theorems, conditional probability and independence, probability distribution. Probability mass function. Distribution and density function. Main discrete probability distributions: binomial, multinomial, Poisson. Main continuous probability distributions: normal, exponential.
4. Introduction to statistical inference.	Point estimation: properties of estimators. Confidence intervals: construction. Hypothesis testing: main concepts. Types of error. Critical level or p-value.
5. Comparison of means	Comparison of two means: dependent and independent samples. Non-parametric tests. Comparison of more than two means: analysis of variance (ANOVA) of one factor. Non-parametric tests.
6. Regression and correlation	Simple linear regression model. The regression line. Goodness of fit and residual analysis. Hypothesis tests for the simple linear regression model Non-linear regression: logarithmic and exponential models.
7. Qualitative data analysis	Contingency tables. Measures of association. Chi-square goodness-of-fit test and Chi-square test of independence.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	33	55	88
Problem solving	7	0	7
Autonomous problem solving	0	21	21
Practices through ICT	15	15	30
Objective questions exam	2	0	2
Essay questions exam	2	0	2

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

Methodologies

	Description
Lecturing	The theoretical contents of the course will be presented in a lecture session and practical exercises will be solved.
Problem solving	Resolution of practical exercises of the course
Autonomous problem solving	Autonomous resolution of practical exercises of the course.
Practices through ICT	Data processing and statistical analyses using the free software R and RStudio.

Personalized assistance

Methodologies	Description
Problem solving	In all the methodologies foreseen in this subject, personalized attention is contemplated, both in the classroom and through voluntary tutorials. Students who wish may attend personal tutorials to resolve doubts and/or uncertainties, mainly at the times indicated on the faculty website and/or on the MOOVI platform. To better optimize the procedure, the student is requested to contact the teacher in advance by email, with reasonable anticipation.
Lecturing	In all the methodologies foreseen in this subject, personalized attention is contemplated, both in the classroom and through voluntary tutorials. Students who wish may attend personal tutorials to resolve doubts and/or uncertainties, mainly at the times indicated on the faculty website and/or on the MOOVI platform. To better optimize the procedure, the student is requested to contact the teacher in advance by email, with reasonable anticipation.
Autonomous problem solving	In all the methodologies foreseen in this subject, personalized attention is contemplated, both in the classroom and through voluntary tutorials. Students who wish may attend personal tutorials to resolve doubts and/or uncertainties, mainly at the times indicated on the faculty website and/or on the MOOVI platform. To better optimize the procedure, the student is requested to contact the teacher in advance by email, with reasonable anticipation.

Practices through ICT	In all the methodologies foreseen in this subject, personalized attention is contemplated, both in the classroom and through voluntary tutorials. Students who wish may attend personal tutorials to resolve doubts and/or uncertainties, mainly at the times indicated on the faculty website and/or on the MOOVI platform. To better optimize the procedure, the student is requested to contact the teacher in advance by email, with reasonable anticipation.

Assessment

	Description	Qualification	Training and Learning Results		
Practices through ICT	Throughout the course, students will carry out four practical case studies of data analysis using R software. Each case study will account for 7.5% of the final grade. The evaluation will be carried out by means of a test through the Moovi platform and the delivery of the code (script) necessary for its resolution.	30	A2 A3 A4 A5	B2 B4	D1 D2
Objective questions exam	Tests throughout the course. Two mid-term exams (multiple-choice test). Each exam will account for 15% of the final grade.	30	A2 A3 A4 A5	C2	D1
Essay questions exam	Final exam on the contents of the course. The exam will consist of solving problems and exercises. A qualification higher than 3.5 points (out of 10) must be obtained in order to pass the course.	40	A2 A3 A4	C2	D1

Other comments on the Evaluation

Continuous evaluation: The student's work throughout the course will be evaluated. In the final qualification, the evaluations/tests carried out throughout the course (practicals and mid-term tests) will represent 60% and the final exam (to be made on the official date) 40%. To pass the subject, it will be compulsory to attend the final exam and to obtain a qualification higher than 3.5 points (out of 10). In case of not obtaining in the final test the minimum qualification to pass the subject, the grade to appear in the official record will be the minimum between 4.9 and the final qualification (weighted).

Second opportunity: In the second opportunity the same scale will be applied as in the continuous evaluation, with the evaluations/tests carried out throughout the course accounting for 60% and the final exam for 40%. In this case, the qualifications of the evaluations/tests carried out throughout the course will be maintained and only the final exam will be repeated, in which a qualification higher than 3.5 points (out of 10) must be obtained in order to pass the subject. In case of not obtaining in the final test the minimum qualification to pass the subject, the grade to appear in the official record will be the minimum between 4.9 and the final qualification (weighted).

Global evaluation: As an alternative to the continuous evaluation system, students may choose to be evaluated with a final exam that will represent 100% of the qualification. In this case, it will be necessary to obtain a qualification higher than 5 points (out of 10) in order to pass the subject. The application for this evaluation option must be submitted in the time and manner determined by the Center, which will be published before the academic start.

The date, time and place of the final exams will be published on the official website of the Faculty of Marine Sciences.

http://mar.uvigo.es/alumnado/examenes/

Students are strongly requested to fulfill a honest and responsible behavior. 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 behavior 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

Mirás Calvo M.A., Sánchez Rodríguez E., **Técnicas estadísticas con hoja de cálculo y R : azar y variabilidad en las ciencias naturales**, 1, Servizo de Publicacións da Universidade de Vigo, 2018

Susan Milton J., **Estadística para la biología y las ciencias de la salud**, 3, McGraw-Hill Interamericana, 2007

Whitlock, M.C. e Schluter, D., **The Analysis of Biological Data**, 3, WH Freeman, 2020

Complementary Bibliography

Fowler F., Cohen L., Jarvis P., **Practical Statistics for Field Biology**, 2, John Wiley and Sons, 2013

Miller J.N., Miller, J.C., **Estadística y Quimiometría para Química Analítica**, 4, Prentice Hall, 2002

Çetinkaya-Rundel, M. e Hardin, J., **Introduction to Modern Statistics**, OpenIntro, 2021

Recommendations

IDENTIFYING DATA				
Geology: Geology 2				
Subject	Geology: Geology 2			
Code	V10G061V01108			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Diz Ferreiro, Paula			
Lecturers	Alejo Flores, Irene Diz Ferreiro, Paula Gago Duport, Luís Carlos Nombela Castaño, Miguel Angel Pérez Arlucea, Marta María			
E-mail	pauladiz@uvigo.es			
Web	http://https://mar.uvigo.es/			
General description	Geology II is a theoretical and practical subject that integrates the action and the results of the external geological processes on the rocks and sediments that constitute the surface of the Earth. Matter of the program English Friendly: The international students can request material and bibliographic references for the follow-up of the subject in English, personal tuition and written examination will be given in English.			

Training and Learning Results	
Code	
A1	Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study
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.
B4	Manage, process and interpret the data and information obtained both in the field and in the laboratory.
C1	know at a general level the fundamental principles of sciences: Mathematics, Physics, Chemistry, Biology and Geology.
C12	Acquire knowledge about processes and products related to internal and external geological cycles.
D1	Develop the search, analysis and synthesis of information skills oriented to the identification and resolution of problems.
D5	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.

Expected results from this subject	Training and Learning Results			
Identify the main mineral constituents and biological in sediments and sedimentary rocks by observations "de visu" in field and laboratory.	A1	B1	C1	D1
Know and differentiate the external geological agents and their effects.	A5		C1 C12	
Recognize the relief forms		B1		
Handle the systems of cartographycal maps		B4		
Handle the principles and the basic instruments of positioning and georeference	A1	B4	C12	D1
Look for and handle specific information.	A5			D1 D5

Contents	
Topic	
0: PRESENTATION	Presentation of the subject. General explanation of theoretical contents-practical and evaluation system.
1: INTRODUCTION	The external geological cycle.
2: THE ATMOSPHERE AND THE HIDROSPHERA	Atmosphere: origin, composition, structure and dynamicS. Oceanic waters and its circulation. Continental waters: the hydrological cycle.

3: METEORIZATION, SOILS AND SEDIMENTARY ROCKS	Meteorization and erosion, types and velocities. Soil formation and soil types. Formation and classification of sediments and sedimentary rocks. Diagenesis
4: THE CONTINENTAL ZONES	Geological processes in glacial environments geological Processes in desert environments Geological processes in fluvial environments Geological processes in lacustrine environments.
5: THE COASTAL ZONE	Terminology associated to the coastal zone. Coastal environments. Morfodynamics.
6: THE CONTINENTAL SHELF AND THE OCEANIC BASINS	Morphology and distribution of marine floors. The continental shelf Reefs The continental slope The deep ocean floor (abyssal basins and mid ocean ridges)
7: GRAVITATIONAL PROCESSES	Gravitational processes in emerged and underwater areas.
SEMINARS	Seminar 1: Clocks in rocks. Seminar 2: ¿What does the Earth do with the CO2?. Seminar 3: Processes of meteorización in rocks.
PRACTICALS	Practical 1: Drawing geological sections. Practical 2:Analysis of maps and geological sections. Calculations dip and strike and thicknesses of layers. Unconformities Practical 3: Space representation in geology: contour maps of marine sediment thickness. Practical 4: Identification of sedimentary rocks. Calculation of the CaCO3 content of marine sediments.
STUDIES EXCURSION	Geological inspection in the itinerary Ramallosa-Baiona to examine the control that exerts the geology, the marine and fluvial dynamics in coastal geomorphology. Identificacion of human impact on the coast

Planning			
	Class hours	Hours outside the classroom	Total hours
Laboratory practical	12	20	32
Seminars	7	15	22
Studies excursion	6	4	10
Lecturing	19	40	59
Report of practices, practicum and external practices	0	12	12
Essay questions exam	2	0	2
Problem and/or exercise solving	1	0	1
Report of practices, practicum and external practices	0	11	11
Report of practices, practicum and external practices	0	1	1
*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	Given the experimental nature of the practicals, attendance is mandatory. Practical 1: Drawing geological sections. Practical 2:Analysis of maps and geological sections. Calculations dip and strike and thicknesses of layers. Unconformities Practical 3: Space representation in geology: contour maps of marine sediment thickness. Practical 4: Identification of sedimentary rocks. Calculation of the CaCO3 content of marine sediments.

Seminars	Given the experimental nature of the seminars, attendance is mandatory. Seminar 1: Clocks in rocks. Seminar 2: ¿What does the Earth do with the CO2?. Seminar 3: Processes of meteorización in rocks.
Studies excursion	Geological evaluation of the itinerary Ramallosa-Baiona to examine the control that exerts the geology, the marine and fluvial dynamics in coastal geomorphology. Identificatiion of human impact on the coast.
Lecturing	Lectures are focused on theoretical contents external geology. Students are encouraged to participate and raise question. Participation will be a plus in the final evaluation of the student.

Personalized assistance

Methodologies	Description
Seminars	The students are encouraged to formulate questions during the development of the seminars. For supplementary tuition, students are required to email the lecturer in advance.
Studies excursion	The students will receive tuition during the development of the studies excursion.
Lecturing	The students are encouraged to formulate questions during the development of the lectures. For supplementary tuition, students are required to email the lecturer in advance.
Laboratory practical	The students are encouraged to formulate questions during the development of the practicas. For supplementary tuition, students are required to email the lecturer in advance.
Tests	**Description**
Report of practices, practicum and external practices	For supplementary tuition regarding the report of practices, students are required to email the lecturer in advance.
Essay questions exam	For supplementary tuition regarding the essay questions exam, students are required to email the lecturer in advance.
Problem and/or exercise solving	Questions raised by students will be solved during lectures.
Report of practices, practicum and external practices	For supplementary tuition regarding the report of seminars, students are required to email the lecturer in advance.
Report of practices, practicum and external practices	Students will be able to formulate specific questions regarding the report of the excursion during the excursion itself

Assessment

	Description	Qualification	Training and Learning Results			
Laboratory practical	Given its experimental character, the assistance to the practical is compulsory.	0		B1 B4	C1 C12	D1
Seminars	Given its experimental character, the assistance to the seminars is compulsory.	0	A1	B1	C1	D5
Studies excursion	Given its experimental character, the assistance to the the excursion is compulsory.	0	A1 A5	B1 B4	C12	D5
Report of practices, practicum and external practices	It requires handing in a report or problem solving exercices in each one of the 4 practicals. It will be evaluated the contents, and the quality of the reports, etc, of each one of the 4 practicals programmed for the subject. Given the compulsory and face-to-face character, reports of non-attendees will not be taken into account.	30	A1	B4	C1 C12	D1
Essay questions exam	The exam will contain specific questions about the contents developed during lectures.	30	A1 A5	B1	C1 C12	
Problem and/or exercise solving	This is a short (10-15 minutes) questionaraire about any theoretical contents explained previously during lectures. It will take place three times during lectures. The dates are indicated in timeline.	10		B1 B4	C12	

Report of practices, practicum and external practices	It requires handing in a report or problem solving exercices in each one of the 3 seminars. It will be evaluated the contents, and the quality of the reports, etc, of each one of the 3 seminars programmed for the subject. Given the compulsory and face-to-face character, reports of non-attendees will not be taken into account.	20	A1	B1 B4	C1 C12		
Report of practices, practicum and external practices	It requires handing in a report or questionnaire about the studies excursion. Given the compulsory and face-to-face character, reports of non-attendees will not be taken into account.	10	A1 A5	B1 B4	C12	D5	

Other comments on the Evaluation

FIRST OPPORTUNITY ASSESSMENT:

The students that have not attended all sesions of practicals, seminars and the studies excursion (except for justified reasons, see regulation*) will not be evaluated, either by continuous or global options.

The final score will be the sum of the mark obtained in each one of the tests as long as they are marked 4 over 10 in seminars, practicals and the essay questions exam. In case they do not reach 4/10 in any of these three test, the final score will be multiplied by 0.5.

SECOND OPPORTUNITY ASSESSMENT:

In the case failing the first opportunity, the assessment in the second opportunity will be a theorical-practical test accounting for 100% of the final mark.

GLOBAL ASSEMMENT OPTION: The application for thisevaluation option must be submitted in the time and manner determined by theCenter, which will be published prior to the academic start. However, it can only be requested if attendance at all mandatory activities is fulfilled (practicals, seminars and the studies excursion) unless adequate justificaction is provided. The global assessment will be a theorical-practical test accounting for 100% of the final mark.

GENERAL CONSIDERATIONS

It is expected the students to behave respectfully and honestly.

It inadmissible any form of fraud (copy and/or plagiarism) to fake the level of knowledge or skills reached by the student in any type of proof, report or work. The fraudulent behaviours entail failing the subject during the whole year.

The use of mobile phones for purposes other than educational, is not allowed during the duration of classroom activities.

Communication by e-mail between students and lecturers must be done using only the institutional e-mail (@alumnos.uvigo.gal). Likewise, this e-mail is the one that must appear in moovi. *See REGULATIONS

*See Regulation: REGULAMENTO SOBRE A AVALIACIÓN, A CALIFICACIÓN E A CALIDADE DA DOCENCIA E DO PROCESO DE APRENDIZAXE DO ESTUDANTADO (Aprobado no claustro do 18 de abril de 2023)

The date, hour and place of the evaluable activities will be published in the official web of the Faculty of Marine Sciences: http://mar.uvigo.es/index.php/es/alumnado/examenes/

Sources of information

Basic Bibliography

Anguita, F y Moreno, F., **Procesos Geológicos Externos y Geología Ambiental**, Rueda,

Tarbuck, E.J. y Lutgens, F.K, **Ciencias de la Tierra. Una introducción a la geología física. 8ª ed.**, Pearson,

Wicander and Monroe, **Geology, Earth in Perspective**, Cengage,

Coastal Geology, Springer, 2022

River Dynamics, Cambridge University Press, 2020

Complementary Bibliography

Geomorphology of Desert Dunes, Cambridge University Press, 2023

Recommendations

Subjects that continue the syllabus

Subjects that it is recommended to have taken before

Geology: Geology 1/V10G061V01103

IDENTIFYING DATA				
Mathematics: Mathematics II				
Subject	Mathematics: Mathematics II			
Code	V10G061V01109			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Hervés Estévez, Javier			
Lecturers	Hervés Estévez, Javier			
E-mail	javiherves@uvigo.es			
Web	http://faitic.uvigo.es			
General description	Basic course of line and surface integrals and differential equations. 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
C1	know at a general level the fundamental principles of sciences: Mathematics, Physics, Chemistry, Biology and Geology.
C2	Acquire basic knowledge of mathematics (differential and integral calculation) and statistics.
D2	Acquire the ability to learn autonomously, continuously and collaboratively, organizing and planning tasks over time.

Expected results from this subject	Training and Learning Results		
□ Understand the concepts of curl and divergence of a vector field. Understand the importance of line and surface integrals and how to use them in the study of the potential energy and other physical questions.	A5	C1 C2	D2
□ Formulate and solve first and second order differential equations.	A5	C1	D2
□ Use a computer program to solve problems related to integral calculus and differential equations.	A5	C1 C2	D2

Contents	
Topic	
Line integrals. Conservative fields.	Regular curves. Integral along a curve. Work done by a field. Conservative fields. Curl. Divergence.
Double integration. Surfaces.	Integration in rectangles. Integration in general areas. Change of variable. Polar coordinates. Green's Theorem. Parametric and regular surfaces. Orientation of a surface.
Surface integrals. Triple integration.	Flow rate. Stoke's theorem. Triple integrals. Spherical and cylindrical coordinates. Gauss' Theorem.
First order differential equations.	Solution of a differential equation. Separable equations. Exact equations. Linear equations.
Higher order linear differential equations.	N-order linear equations. Solutions.Second-Order Equations with Constant Coefficients. General solution to a homogeneous equation. Particular solution to a complete equation.
Laboratory topics	Integration and differential equations problem solving using computer software.

Planning	Class hours	Hours outside the classroom	Total hours
Lecturing	26	26	52
Seminars	18	18	36
Practices through ICT	4	2	6
Autonomous problem solving	0	10	10

Collaborative Learning	4	0	4
Essay questions exam	4	14	18
Problem and/or exercise solving	2	6	8
Problem and/or exercise solving	2	6	8
Problem and/or exercise solving	2	6	8

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

Methodologies

	Description
Lecturing	Explanation of the theoretical basis and resolution of exercises and basic examples.
Seminars	Activities focused to individual work or in group to solve problems in order to expand and deepen the contents. They are used as a complement to the theoretical lectures.
Practices through ICT	Learning a computer program for calculation and graphic representation.
Autonomous problem solving	Students must solve problems using the methodology and information available and be able to interpret the results.
Collaborative Learning	Specific teamwork activities..

Personalized assistance

Methodologies	Description
Seminars	Students will ask the professor about clarifications for a better understanding of the subject and successfully carry out the proposed tasks.
Practices through ICT	Students will ask the professor about clarifications for a better understanding of the subject and successfully carry out the proposed tasks.
Collaborative Learning	Students may attend office hours to ask for extra help or seek clarification of the material presented in class. It is necessary to contact the teacher in advance by e-mail to schedule an appointment.

Assessment

	Description	Qualification	Training and Learning Results		
Practices through ICT	Students are required to solve some exercises with the software used in the laboratory sessions.	15	A5	C2	D2
Essay questions exam	At the end of the course there will be a final test with multiple choice questions, short answer questions and/or problems.	40	A5	C1 C2	D2
Problem and/or exercise solving	Oral presentation or written assignment in which the student must solve a series of problems under the conditions and time set by the teacher.	15	A5	C1 C2	D2
Problem and/or exercise solving	Oral presentation or written assignment in which the student must solve a series of problems under the conditions and time set by the teacher.	15	A5	C1 C2	D2
Problem and/or exercise solving	Oral presentation or written assignment in which the student must solve a series of problems under the conditions and time set by the teacher.	15	A5	C1 C2	D2

Other comments on the Evaluation

The date, time and location of the final test will be published on the official website of the Faculty of Marine Sciences: http://mar.uvigo.es/alumnado/examenes/

The assessment system will select the best grade between the following:
a) the one obtained from the five previous items with their respective weights.
b) the one obtained in the final exam with a weight of 100%.
For this reason, the students of this subject will not have to choose between continuous or global assessment since the system selects the most convenient for them.
Students who do not pass the subject in the ordinary call, and intend to do so in the extraordinary call, will maintain the grades obtained during the course.
The students of the extraordinary "fin de carrera" call will be evaluated with an exam that will count 100% of the grade.
Students are required to take this course responsible and honest behavior. Any form of fraud (copying or plagiarism) aimed at falsifying the level of knowledge and skills achieved in all types of evidence, reports or work is considered inadmissible. Fraudulent conduct may mean failing the subject for a full course.

Sources of information

Basic Bibliography

Besada, M.; García Cutrín, J.; Mirás Calvo, M.A.; Quinteiro, C.; Vázquez, C., **Un mar de matemáticas**, Servizo de publicacións da Universidade de Vigo, 2016

Besada, M.; García Cutrín, J.; Mirás, M.; Quinteiro, C.; Vázquez, C., **Matlab: todo un mundo**, Servizo de publicacións da Universidade de Vigo, 2007

Larson, R.; Edwars, B., **Cálculo. Vol 1 e 2.**, 9º, McGraw-Hill, 2010

Adams, R., **Cálculo**, 6ª, Pearson, 2009

Complementary Bibliography

Besada, M.; García Cutrín, J.; Mirás Calvo, M.A.; Quinteiro, C.; Vázquez, C., **Matemáticas á Boloñesa**, Servizo de publicacións da Universidade de Vigo, 2014

Thomas, George B. Jr., **Cálculo, varias variables**, 12ª, Pearson, 2010

Campbel, S.; Haberman, R., **Introducción a las ecuaciones diferenciales**, McGraw-Hill, 1998

Bradley, G.; Smith, K., **Cálculo de varias variables (Volume 2)**, Prentice Hall, 1998

Recommendations

Subjects that it is recommended to have taken before

Mathematics: Mathematics I/V10G061V01104

Other comments

It recommends to had studied the subject of Mathematical II of the second course of high school.

IDENTIFYING DATA

Chemistry: Chemistry 2

Subject	Chemistry: Chemistry 2			
Code	V10G061V01110			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Prieto Jiménez, Inmaculada			
Lecturers	Fernández Nóvoa, Alejandro Mandado Alonso, Marcos Prieto Jiménez, Inmaculada			
E-mail	iprieto@uvigo.es			
Web	http://moovi.uvigo.gal			
General description	The subject "Chemistry II" corresponds to first year of Chemistry in the degree of Marine Sciences at the University of Vigo. It aims to introduce students to the thermodynamic vision of Chemistry. For this, a review of principles will be carried out with the rigorous definition and meaning of the state functions such as those of Gibbs and Helmholtz, in addition to the chemical potential. From them we will define the equilibrium conditions and apply them to the study of phases and chemical processes. We will also consider how Thermodynamics approaches the study of ideal and real solutions and colligative properties. The teaching is divided into three parts. The first will present the theoretical part of the subject and some examples or theoretical applications of it. The second will consist of seminars for the resolution of exercises stimulating the participation/performance on the part of the students. The third part corresponds to the laboratory practices, where real applications (experimental sessions) of what has been studied in the other two parts will be dealt with and that will help the students assimilate the dynamics of work in a Chemistry laboratory. Subject of the English Friendly program: International students may request from the faculty: a) materials and bibliographical references to follow the subject in English, b) attend tutorials in English, c) tests and assessments in English.			

Training and Learning Results

Code	
A1	Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
B4	Manage, process and interpret the data and information obtained both in the field and in the laboratory.
C6	Acquire the fundamentals and terminology of chemical 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			
Knowledge and employment of basic concepts of thermodynamics. Knowledge of the processes of transfer of heat and the processes of mixture in marine means.	A1	B4	C6	D1 D2
Knowledge and understanding of the phase equilibrium and the phase changes.		B4		D1 D2
Knowledge of the model of ideal solutions and colligative properties. Apply the colligative properties to the water of the sea.	A5	B4	C6	D2
Knowledge of the properties of the real and electrolyte solutions. Knowledge and application of the concept of activity. Knowledge of the description of the sea water as an aqueous electrolyte solution and analysis of related properties.	A5	B4	C6	D1 D2
Application of the concept of chemical equilibrium to real and electrolyte solutions. Knowledge of the influence of the characteristics of sea water in chemical reactions in that medium.	A5	B4	C6	D1 D2

Contents

Topic	
1. Principles of thermodynamics	The internal energy and the first principle. Enthalpy. Heat capacities. Ideal gases and first principle. Entropy and second principle. Calculation of entropy differences. Entropy, reversibility and irreversibility.
2. Thermodynamic functions	Gibbs and Helmholtz functions. Gibbs equations. Calculation of changes in state functions. Partial molar magnitudes. Chemical potential.
3. Phase equilibrium in one-component system	Phase equilibrium conditions. The phase rule. Phase diagram of water. The equations of Clapeyron and Clausius-Clapeyron.
4. Thermodynamics of ideal solutions	Chemical potential of an ideal gas. Ideal solutions. Vapor pressure. Ideal diluted solutions. Colligative properties: their influence on sea water. Osmotic pressure.
5. Thermodynamics of real solutions and electrolyte solutions	Deviations from Raoult's Law. Activity and activity coefficient. Determination of activities and activity coefficients. Chemical potential in electrolyte solutions and their activity coefficient. Debye-Hückel's theory. Thermodynamics of solvation of ions. Sea water as an electrolyte solution. Quantitative treatment of polyelectrolyte solutions.
Thermodynamics of chemical equilibrium	Chemical equilibrium and degree of progress of a reaction. Variation of the equilibrium constant with temperature. Chemical equilibrium in real solutions. Chemical equilibrium in electrolyte solutions. Effect of ionic strength on equilibrium.
Laboratory practices	Practices related to the following topics will be carried out: Enthalpy of dissolution. Method of solubility: enthalpy. Hot. Heat capacity. Effect of ionic strength on solubility. Chemical balance. Solubility product. Balance constant. Activity. Coefficient of activity. Ionic strength and its effect on the equilibrium constant. Dissolution and neutralization heat. Calorimetric method. Enthalpy, heat, heat of reaction, thermal capacity. Integral and differential heat. Ebulloscopic increase. Raoult's Law. Chemical potential. Enthalpy of vaporization. Study of the liquid-vapor equilibrium of mixtures of two liquids. Rule of the phases. Liquid-vapor balance. Phase diagram. Raoult's Law. Chemical potential. Coefficient of activity

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	23	35	58
Seminars	14	35	49
Laboratory practical	15	5	20
Essay questions exam	0	2	2
Essay questions exam	3	6	9
Problem and/or exercise solving	0	12	12
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Lecturing	Theoretical classes taught through a presentation (available to students in the Moovi platform). In these classes will be introduced the basic contents, with emphasis in more important and difficult topics. Numerical problems will be also solved. The bulletins of problems will be available in the Moovi platform.
Seminars	Destined to the resolution of numerical problems and debate of the questions and exercises. The necessary material will be available in the Moovi platform. In addition, the students will solve proposed exercises and questions, according to the guidelines established by professors in the classes or seminars of the subject
Laboratory practical	Application of techniques of laboratory in practical problems related with the subject. The material will be available in the Moovi platform.

Personalized assistance	
Methodologies	**Description**
Lecturing	Sessions in which professors solve the doubts and queries related to the subject, and with the activities carried out during the course. Students may attend personalized tutorials to resolve doubts. To optimize time, it is convenient to agree with professors on the date and time of the tutorial in advance.
Seminars	Ídem
Laboratory practical	Ídem
Tests	**Description**

Essay questions exam	Ídem
Problem and/or exercise solving	Ídem
Essay questions exam	Ídem

Assessment

	Description	Qualification	Training and Learning Results			
Laboratory practical	In this section could be valued: - The work carried out by the students in the laboratory. - The report on the laboratory experiments carried out by the students. - Test about the work developed. Attendance at laboratory experiments is required. To overcome the subject the student should reach at least 50% of the maximum possible score for this activity.	15		B4		D2
Essay questions exam	Written exam in which the level of theoretical knowledge and problem solving skills will be checked. It will be made in the middle of the semester. See "Other comments on the evaluation"	30	A1 A5	B4	C6	D1 D2
Essay questions exam	Written exam in which the level of theoretical knowledge and problem solving skills will be checked. It will be made in the date determined by the Faculty. See "Other comments on the evaluation"	30	A1 A5	B4	C6	D1 D2
Problem and/or exercise solving	The resolution of problems and questions proposed in the classroom and/or on the Moovi platform will be valued	25	A1		C6	D1 D2

Other comments on the Evaluation

The participation of students in any of the assessment activities of the subject will involve the assignment of a grade. Regarding this point, attendance at the laboratory sessions (two or more), realization of 20% of the exercises proposed by the professor and the realization of written tests will be considered.

The final grade of the subject will be the weighted addition of the marks for all the sections, provided that the minimum score required in each of them is reached.
The students who only carry out the laboratory practices will receive the qualification resulting from the application of the percentage corresponding to this section.The qualification corresponding to the written tests will be the average of the grade obtained in both and, to pass the subject, a score equal to or greater than 4 points out of 10 must be achieved. In case of obtaining a grade of less than 4 points out of 10, the grade that will be obtained will be the weighted grade of the written tests.

Evaluation in extraordinary call

In the July call, the previous percentages will be respected, maintaining the qualifications obtained in the laboratory practices and in the resolution of exercises and questions.
In this call, students will be able to recover the qualification corresponding to the written tests (60%) by taking a global test. To pass the subject, you must achieve a score equal to or greater than 4 points out of 10 in this test.The final grade of the subject will be the weighted addition of the marks for all the sections, as long as the required score are reached. If this is not the case, the final mark for the subject will be the weighted grade of the global test.

Global evaluation

Students who wish to opt for the global evaluation (EG) must request it within the period and in the manner established by the Faculty. This information will be available to students before the start of the academic period.To pass the subject, it is necessary to carry out the practices and also achieve at least 50% of the maximum possible score for this activity.The students who opt for the EG will take a test in which all the content of the subject will be assesed. This test will constitute 85% of the final grade for the subject, both in the ordinary and extraordinary calls. To pass the subject, it is necessary to obtain a grade equal to or greater than 5.0 points out of 10 in this test.

Other considerations

The assessment test schedule can be found at: http://mar.uvigo.es/alumnado/examenes/

IMPORTANT: 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 professor proposed work. This fraudulent behavior will be sanctioned

with the firmness and rigor established by current regulations.

Sources of information

Basic Bibliography

Levine, **Fisicoquímica**, McGraw-Hill. 5ª Ed. (2004),

Atkins, **Química Física**, 8ª Ed. , Ed. Omega (2008),

Levine, **Problemas de Fisicoquímica**, 6ª Ed. McGraw-Hill (2014),

Complementary Bibliography

J. Pellicer, J. A. Manzanares, **100 Problemas de Termodinámica**, Síntesis (1996),

Laidler, Meiser, Sanctuary, **Physical Chemistry**, Edition, Houghton Mifflin (2002),

Klotz, Rosenberg, **Chemical Thermodynamics: Basic Theory And Methods**, 6th Ed., John Wiley (2000),

Rock, **Termodinamica Quimica**, Vicens-Vives (1989),

Rodríguez Renuncio, Ruiz Sánchez, Urieta Navarro, **Problemas resueltos de termodinámica química**, Síntesis. (2000),

W. Stumm, J. J. Morgan, **Aquatic Chemistry (Chemical equilibria and rates in Natural Waters)**, 3ª Ed. John Willey & Sons (1995).,

D. Eisenberg e D. Crothers, **Physical Chemistry with Applications to the Life Sciencies**, Benjamin/Cummings Publishing Company.(1979),

J. Wright e A. Colling, **Sea-water: its composition, properties and behaviour**, Oceanography, vol.2. The Open University. Pergamon Press.(1991),

Recommendations

Subjects that continue the syllabus

Chemical oceanography I/V10G061V01204

Chemical oceanography II/V10G061V01209

Subjects that are recommended to be taken simultaneously

Mathematics: Mathematics II/V10G061V01109

Subjects that it is recommended to have taken before

Physics: Physics I/V10G061V01102

Mathematics: Mathematics I/V10G061V01104

Chemistry: Chemistry I/V10G061V01105