



(*)Facultade de Ciencias do Mar

(*)Grao en Ciencias do 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	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Pasantes Ludeña, Juan José Miguel Villegas, Encarnación de			
Lecturers	Miguel Villegas, Encarnación de Pasantes Ludeña, Juan José			
E-mail	pasantes@uvigo.es villegas@uvigo.es			
Web				
General description	<p>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:</p> <ol style="list-style-type: none"> 1) cell and tissue organisation. 2) development and cell differentiation. 3) transmission and characterization of hereditary material. 4) basic aspects of evolution and the origin of species. <p>Theoretical and practical lessons are employed in the teaching program in order the students be familiar with</p> <ol style="list-style-type: none"> 1) basic histological methods and microscopic identification 2) the solving of practical problems in genetics and cell biology. <p>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.</p>			

Competencies	
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.

Learning outcomes	
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		
CELL BIOLOGY	B4		
4. Recognize the diversity and organisation of cells and tissues	B5		
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. Optical microscope utilization			
9. Knowing staining techniques			
10. Identification of cell organelles by electron microscopy and tissues by optical microscopy			
GENETICS			
11. Importance of DNA in biology			
12. Apply the scientific method and basic research technologies in Genetics			
13. Learn how to establish genetic hypotheses and strategies to refute them			
14. Manage the basic mechanisms for the transmission of the hereditary material			
15. Know the molecular structure, the regulation and the expression of the hereditary material			
16. Know the basic genomic principles and their biotechnological applications.			
17. 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. Endosymbiosis: Evolutionary importance. Similarities and differences of animal and plant cells. Cell membranes: composition. Functional properties. Plasma membrane and cell surface. Cell junctions and cell adhesion. Cell communication. Cytoplasm and cell organelles (I): Endoplasmic reticulum, Golgi and lysosomes. Vesicular traffic (II): peroxysomes, mitochondria and chloroplasts. Cytoskeleton 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 zygote. Cell specialization.
Cell biology, 3rd part. Tissues	Animal tissues. Epithelium: General organisation and function. Connective tissue and derivatives. General organisation. Specialized connective tissues : general characteristics of cartilage, bone and blood. Muscular tissue. Nervous tissue. The plant cell.
Genetics	DNA structure, organisation, replication, alterations and expression. Mendelian heredity and its variations. Linkage 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
Lecturing	The teaching staff will continuously assess the participation of the students along the master sessions and their on-line activities

Problem solving	The teaching staff will continuous assess the participation of the students in exercise solving and in the quality of solved exercises
Tests	Description
Problem and/or exercise solving	he teaching staff will continuous assess the quality of the solved problems, questions and exercices for each student along the semester

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 24 % Genetics 29 %	53	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: 1: The assesment of the quality of the resolution of the Genetic problems and exercises proposed along the course (20 %) 2: The marks obtained in Cell biology questionnaires, exercises and identification of structures (25 %)	45	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 questionnaires along the course (45 %: Cell Biology 25 %, Genetics 20 %). This mark will be kept for the second opportunity

b) The mark obtained in the first or second opportunity exam (55 %: Cell Biology 25 %, Genetics 30 %).

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 explicitly in accordance with it.

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

<http://mar.uvigo.es/index.php/en/alumnado-actual-2/examenes-3>

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

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

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

Pierce BA, **Genética. Un enfoque conceptual**, 978-1319050962, 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**, 978-8498353921, 4ª ed, Garland Science, 2017

Recommendations

Subjects that continue the syllabus

Marine genetic resources/V10G060V01907

Other comments

The study of the subject in a continuous way will allow the students to take part in active form in the course syllabus. 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, comprehending, 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.

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

* Teaching methodologies maintained

* Teaching methodologies modified

None. All methodologies will be carried out telematically by means of the utilities accessible through the Remote Campus of the University of Vigo.

* Non-attendance mechanisms for student attention (tutoring)

Institutional e-mail

Applications available from Remote Campus of the University of Vigo

* Modifications (if applicable) of the contents

Not applicable

* Additional bibliography to facilitate self-learning

<https://www.ncbi.nlm.nih.gov/books?term=The+Cell%3A+a+molecular+approach+AND+cooper%5Bbook%5D>

<https://www.ncbi.nlm.nih.gov/books/NBK21054/?term=alberts%20molecular%20biology%20of%20the%20cell>

<https://www.ncbi.nlm.nih.gov/books/NBK9983/>

<https://www.lab.anhb.uwa.edu.au/mb140/>

<https://www.ncbi.nlm.nih.gov/books/NBK21766/?term=genetics>

* Other modifications

=== ADAPTATION OF THE TESTS ===

* Tests already carried out

No change

* Pending tests that are maintained

All

* Tests that are modified

None

* New tests

None

* Additional Information

Students will be visually monitored in telematic exams through Remote Campus. If there is any technical or personal problem, recorded oral exams will be performed. Exam revision sessions will also be recorded.

IDENTIFYING DATA				
Physics: Physics I				
Subject	Physics: Physics I			
Code	V10G061V01102			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	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				
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 environment and the development of models related with it. Furthermore, it is important to understand the fundamental physics concepts to understand how the instruments work and to know how to use and control them.			

Competencies

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.

Learning outcomes

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.	<p>1.1. The position vector and the path. Celerity, velocity and acceleration (medium and instantaneous).</p> <p>1.2. Intrinsic components of acceleration (normal and tangential) and his interpretation.</p> <p>1.3. Movement of the particle in space. Analysis of different types of movements.</p> <p>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</p>
2. Newtonian dynamics.	<p>2.1. Introduction: Dynamics as a part of physics.</p> <p>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.</p> <p>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.</p> <p>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.</p>
3. Work and energy	<p>3.1. The different forms of energy. Definitions of work, power and energy.</p> <p>3.2. Mechanical, kinetic and potential energy. Theorem of live forces. Conservation mechanical energy.</p> <p>3.3. Mechanical, kinetic and potential energy of a system of particles.</p> <p>3.4. Theorem of live forces and conservation of energy for a system of particles.</p> <p>3.5. Kinetic rotational energy.</p>
4. Simple harmonic motion.	<p>4.1. The simple harmonic motion. Kinematics of the harmonic oscillator. Representation as rotating vectors.</p> <p>4.2 Dynamics of the harmonic oscillator and his physical interpretation. Energy of a harmonic oscillator.</p> <p>4.2. The simple pendulum.</p> <p>4.3. Notion of forced oscillator. Resonance.</p> <p>4.4. Fourier analysis of the periodic movement.</p>
5. Gravitation. Applications to the Earth.	<p>5.1. Historical evolution.</p> <p>5.2. Newton's law of Gravitation.</p> <p>5.3. Gravitational field and potential on Earth. The local gravitational field.</p> <p>5.4. Movement of the planets and satellites</p>
6. The Earth as a reference system.	<p>6.1. The movements of the Earth in space. The stations. The phases of the Moon.</p> <p>6.2. Dimensions and terrestrial coordinates.</p> <p>6.3. The local reference system. Accelerations of inertia.</p> <p>6.4. The Coriolis acceleration.</p> <p>6.5. The centrifugal and terrestrial acceleration. The geopotential.</p> <p>6.6. Newtonian theory of tides. The tidal ellipsoid.</p>
7. Continuous media	<p>7.1. Introduction, qualitative ranking of the material.</p> <p>7.2. Elasticity and shear deformation.</p> <p>7.3. The stress tensor.</p>

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practical	15	1	16
Lecturing	30	50	80
Seminars	7	25	32
Problem and/or exercise solving	0	15	15
Report of practices, practicum and external practices	0	7	7

*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.
Lecturing	Exhibition and explanation of the diverse physical concepts and his motivation, of the distinct laws with which relate, as well as the demonstration 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 current year.

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	It will be a test with problems similar to the ones solved during the seminars' sessions.	10	A4 A5	C4	D1 D2
Problem and/or exercise solving	It will qualify the assimilation of knowledge of the students with a written proof with a diversity of problems related with the theory and seminars.	70	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.	20	A4 A5	B3 C4	D1 D2

Other comments on the Evaluation

Date, time and place of exams will be published in the official web of Marien Ciencias Faculty:
<http://mar.uvigo.es/index.php/en/alumnado-actual-2/examenes-3>

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.

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

* Teaching methodologies maintained: ALL

* Teaching methodologies modified: None. All methodologies will be given by telematic means through the use of the utilities integrated in the Remote Campus of the University of Vigo and the FAITIC platform as reinforcement, without prejudice to other measures that can be adopted to guarantee the accessibility of the students to the teaching content.

* Non-attendance mechanisms for student attention (tutoring): The tutoring sessions may be carried out by telematic means (institutional email of the teaching staff involved in the subject available on the website of the Faculty, videoconference using the telematic applications integrated in the Remote Campus of the University of Vigo, forums in FAITIC, ...) under the arrangement of prior appointment.

* Modifications (if applicable) of the contents: Not applicable.

* Additional bibliography to facilitate self-learning: None.

* Other modifications: None.

=== ADAPTATION OF THE TESTS ===

* Tests already carried out: Percentages are maintained.

* Pending tests that are maintained: ALL

* Tests that are modified: NONE

* New tests: NONE

* Additional Information:

The telematic controls, tests and/or exams in the remote campus will be done with audiovisual monitoring of the students. If there are technical or personal impediments that prevent it, the tests will be oral. All tests will be recorded for documentary evidence. This will also happen with exam review sessions.

IDENTIFYING DATA				
Geology: Geology 1				
Subject	Geology: Geology 1			
Code	V10G061V01103			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	Spanish			
Department				
Coordinator	Nombela Castaño, Miguel Angel			
Lecturers	Alejo Flores, Irene López Pérez, Ángel Enrique 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 second semester of the 1st course of the Degree of Marine Sciences, 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 Plates Tectonics and the Marine Geology.			

Competencies	
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.

Learning outcomes				
Expected results from this subject			Training and Learning Results	
New			A2	B1
2. Know and relate the internal processes with the tectonic of plates.			A1	B4 C12
3. Recognize tectonic structures and the processes that generate them.			A1	B4 C12
4. Handle of deformation structures representation systems.				B1 B4 D5
5. Interpretation of geological maps.			A2	B1 B4 D1 D5
6. Identify the main mineral and igneous and metamorphic rocks.			A1	C12 D1 D5
7. Skill in the management of the geological information related with the internal geological processes, capacity of synthesis and to work in a team.			A1	B4 C12 D1 D5

Contents	
Topic	
Presentation Geology II	The sub-topics correspond with the topics.
Subject 1. Introduction	The subtemes correspond with the subjects.
Subject 2. Structure of the Earth and his materials: minerals and rocks	The sub-topics correspond with the topics.
Subject 3. Units of the Terrestrial Relief-Deep Ocean: types of margins	The sub-topics correspond with the topics.
Subject 4. Earth Surface Deformación: faults and folds	The sub-topics correspond with the topics.

Subject 5. Plate Tectonics: introduction and mechanisms	The sub-topics correspond with the topics.
Subject 7. Metamorphism, metasomatism, metamorphic rocks and Plates Tectonic	The sub-topics correspond with the topics.
Subject 8. Magmatism, Igneous rocks and Plates Tectonic	The sub-topics correspond with the topics.
Subject 9. Vulcanism and Plates Tectonic	The sub-topics correspond with the topics.
Subject 9. Seismicity and Tectonic of Plates	The sub-topics correspond with the topics.
Subject 10. Synthesis: Economic and environmental implications of the internal geological system.	The sub-topics correspond with the topics.

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	It will present him to the student the way in which they will give the classes, the form of evaluation, the exits of field, the practical classes and the seminars. It will deliver the topics, as well as the necessary material for the practical classes and seminars.
Lecturing	They will expose him to the student the theoretical contents that they will be evaluated in a final examination.
Seminars	It will use the stereographic projection to represent data of geological structures. Practical works on faults. They will familiarise with the keys of identification of minerals.
Laboratory practical	They will learn to handle with topographical maps and to order in the time the rocks and geological processes from geological courts. Besides, the student will learn to recognise the minerals and the types of igneous and metamorphic rocks more common in the nature.
Studies excursion	The student will learn to handle the geological compass, recognise rocks and geological structures in the field, his implications in the internal processes, and his consequences applied.

Personalized assistance

Methodologies	Description
Lecturing	The student will be able to be attended so much during Master sessionss, if it does not affect of sensitive way in the development of the same, and in the hours of tutorías (Monday, Tuesday and Wednesday of 12:00 to 14:00). To optimise the time, is necessary that the students contact with the professor with enough time.
Introductory activities	The student will be able to be attended during the introductory activities, if it does not affect of sensitive way in the development of the same, and in hours of tutorías (Monday, Tuesday and Wednesday of 12:00 to 14:00). To optimise the time, is necessary that the students contact with the professor with enough time.
Seminars	The student will be able to be attended so much during the seminars, if it does not affect of sensitive way in the development of the same, and in hours of tutorías (Monday, Tuesday and Wednesday of 12:00 to 14:00). To optimise the time, is necessary that the students contact with the professor with enough time.
Laboratory practical	The student will be able to be attended so much during Laboratory practises, if it does not affect of sensitive way in the development of the same, and in hours of tutorías (Monday, Tuesday and Wednesday of 12:00 to 14:00). To optimise the time, is necessary that the students contact with the professor with enough time.
Studies excursion	The student will be able to be attended so much during field practices, if it does not affect of sensitive way in the development of the same, how in hours of tutorías (Monday, Tuesday and Wednesday of 12:00 to 14:00). To optimize the time, is necessary that students contact with the professor with enough time.

Tests	Description
Problem and/or exercise solving	The student will be able to be attended so much during the seminars, if it does not affect of sensitive way in the development of the same, and in hours of tutorías (Monday, Tuesday and Wednesday of 12:00 to 14:00). To optimise the time, is necessary that the students contact with the professor with enough time.
Laboratory practice	The student will be able to be attended so much during Laboratory practises, if it does not affect of sensitive way in the development of the same, and in hours of tutorías (Monday, Tuesday and Wednesday of 12:00 to 14:00). To optimise the time, is necessary that the students contact with the professor with enough time.
Report of practices, practicum and external practices	The student will be able to be attended so much during field practices, if it does not affect of sensitive way in the development of the same, how in hours of tutorías (Monday, Tuesday and Wednesday of 12:00 to 14:00). To optimize the time, is necessary that students contact with the professor with enough time.
Objective questions exam	The student will be able to be attended so much during Master sessionss, if it does not affect of sensitive way in the development of the same, and in the hours of tutorías (Monday, Tuesday and Wednesday of 12:00 to 14:00). To optimise the time, is necessary that the students contact with the professor with enough time.

Assessment					
	Description	Qualification	Training and Learning Results		
Problem and/or exercise solving	The assistance to seminars is compulsory. It will evaluate so much the quality of the deliverables like the attitude (participation, implication, etc.)	8	A1 A2		D1 D5
Laboratory practice	The assistance to laboratory practices is compulsory. It will evaluate so much the quality of the deliverables like the attitude (participation, implication, etc.)	15	A2	B1 B4	D1
Report of practices, practicum and external practices	The assistance to studies excursion is compulsory. It will evaluate so much the quality of the deliverables like the attitude (participation, implication, etc.)	7	A2	B1 B4	C12
Objective questions exam	They will evaluate the contents with short questions and/or ask false/true type. To be able to add the rest of proofd, in the exam has to have at least a 3.5/10	70	A1	B1 B4	C12 D5

Other comments on the Evaluation

The students of the 3rd Age University Program that choose this subject inside the cycle of Integration to be able to it surpass will have to assist at least to 80% of the lectures as well as at least to 80% of the rest of the methodologies employed (seminars, practices of laboratory and field trip). On the other hand it will value the level of integration with the students of the degree.

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

<http://mar.uvigo.es/index.php/en/alumnado-actual-2/examenes-3>

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

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

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,

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

Monroe, J.S., Wicander, R., Pozo, M., **Geología.Dinámica y evolución de la Tierra.**, Ed. Paraninfo, Madrid,
 Tarbuck, E.J., Lutgens, F.K., **Ciencias de la Tierra. Una introducción a la Geología Física**, 10th Edition. Prentice Hall.
 Madrid. 710 pp.,
 Wicander, R., Monroe, J.S., **Historical Geology. Evolution of Earth and Life Through Time**, 7th Edition.
 Edit.Brooks/Cole, 580 pp,

Recommendations

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

* Teaching methodologies maintained

- 1.- Mixed teaching: they keep
- 2.- Teaching no face-to-face: they will adapt to the available resources.

* Teaching methodologies modified

- 1.- Mixed teaching: they do not modify
- 2.- Teaching no face-to-face: the seminars, practices of laboratory and field excursions will treat of virtualize the most possible. Likewise it will propose activities that stimulate his self learning.

* Non-attendance mechanisms for student attention (tutoring)

- 1.- Mixed teaching: previous concertation by email, face-to-face and/or virtual through Remote Campus.
- 2.- Teaching no face-to-face: previous concertationn by email, virtual through Remote Campus

* Modifications (if applicable) of the contents

- 1.- Mixed teaching: it does not have intention to change the contents
- 2.- Teaching no face-to-face: it does not have intention to change the contained

* Additional bibliography to facilitate self-learning

Is not necessary

* Other modifications

=== ADAPTATION OF THE TESTS ===

* Tests already carried out

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

- 1.- Mixed teaching: they conserve the weights of the face-to-face situation.
- 2.- Teaching no face-to-face: Seminars (08%)/(15%); Practical Laboratory (15%)/(20%); Field excursion (07%)/(15%); Examan (70%)/(50%)

* Pending tests that are maintained

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

...

* Tests that are modified

[Previous test] => [New test]

- 1.- Mixed teaching: they do not modify
- 2.- Teaching no face-to-face: face-to-face examination ==> virtual examination with Fatic and Remote Campus.

* New tests

* Additional Information

During the no face-to-face teaching, requires of the students that, in these exceptional circumstances, face this matter with a responsible and honest behaviour. It will consider inadmissible any form of copy directed to false the level of knowledges and skills reached in the preparation of the homeworks, as well as during the virtual examination. If there is some suspicion of some type of fraudulent behaviour, will be able to subject to the students to an additional control to check his veracity.

IDENTIFYING DATA				
Mathematics: Mathematics I				
Subject	Mathematics: Mathematics I			
Code	V10G061V01104			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	Galician			
Department				
Coordinator	García Cutrín, Francisco Javier Besada Morais, Manuel			
Lecturers	Besada Morais, Manuel García Cutrín, Francisco Javier Vázquez Pampín, Carmen			
E-mail	fjgarcia@uvigo.es mbesada@uvigo.gal			
Web	http://fatic.uvigo.es			
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.			

Competencies	
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.

Learning outcomes			
Expected results from this subject	Training and Learning Results		
To use with ease techniques of calculation of eigenvalues of a square matrix and of determination of the sign of a quadratic form. Solve problems in which you need to apply the techniques above.	A1	C1	D1
	A2	C2	D2
	A3		D3
	A4		D4
	A5		D5
Understand some basic concepts of differential calculus: partial derivatives, continuously differentiable function, chain rule, implicitly defined function, end / optimum of scalar functions.	A1	C1	D1
	A2	C2	D2
	A3		D3
	A4		D4
	A5		D5
Use the mechanics of calculation of partial derivatives of any order, of application of the chain rule, derivation of implicitly defined functions, as well as the techniques of calculating optimal / extreme with and without equality constraints. Apply the previous techniques to solving optimization problems.	A1	C1	D1
	A2	C2	D2
	A3		D3
	A4		D4
	A5		D5

To know the primitives of elementary functions and the main techniques of calculation of these. Understand the mechanics of calculating double integrals.	A1	C1	D1
	A2	C2	D2
	A3		D3
	A4		D4
	A5		D5
Use the mechanics of calculating primitives and double integrals with simple functions. Know how to apply the integral calculation to the determination of areas, volumes, centers of gravity, moments of inertia, etc.	A1	C1	D1
	A2	C2	D2
	A3		D3
	A4		D4
	A5		D5
Use a computer program, of symbolic calculation, for the resolution of problems related to the subject.	A1		D1
	A2		D2
	A3		D3
	A4		D4
	A5		D5

Contents

Topic	
Linear algebra.	Operations with vectors in the plane and in space. The vector space R^n . Matrices and determinants. Basic operations with matrices and determinants. Discussion and resolution of systems of linear equations. Eigenvalues.
Calculation in several variables.	Introduction to the functions of several variables. Differentiable functions. Chain rule. Implicit derivation. Derivatives of higher order.
Optimization.	Maximum and minimum of scalar functions. Calculation of maxima and minima.
Integration of functions.	Integral of Riemann. The fundamental theorem of integral calculus. Calculation of primitives. Application to the calculation of areas. Integrals improper.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	13	20	33
Problem solving	13	20	33
Seminars	18	24	42
Practices through ICT	8	8	16
Problem and/or exercise solving	4	9	13
Essay questions exam	3	10	13

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

Methodologies

	Description
Lecturing	Exposition of the theoretical bases and orientation, on the part of the teachers, on the contents of the subject.
Problem solving	Activities focused on the work on a specific topic, which allow to deepen or expand the contents of the discipline. They will be used as a complement to the theoretical classes.
Seminars	The students solve exercises in the classroom, in small groups, under the guidelines and supervision of the faculty and make an exposition of the solution of the same in front of fellow students.
Practices through ICT	Use of a scientific calculator to help solve the exercises proposed in seminars and master sessions. They take place in computer classrooms.

Personalized assistance

Methodologies	Description
Seminars	The students will demand from the faculty the clarifications that they deem opportune to better understand the subject and to develop successfully the proposed tasks. The individual work of the student will also be monitored.
Practices through ICT	The students will demand from the faculty the clarifications that they deem opportune to better understand the subject and to develop successfully the proposed tasks. The individual work of the student will also be monitored.

Assessment

Description		Qualification	Training and Learning Results		
Seminars	The degree of consolidation of the competences analyzed in each session will be assessed. The students will deliver a series of exercises under the conditions and time established by the teaching staff.	25	A1 A2 A3 A4 A5	C1 C2	D1 D2 D3 D4 D5
Practices through ICT	Proof that the student must solve some exercises using the computer program used in the classroom.	5	A5		D1
Problem and/or exercise solving	Tests, to evaluate the acquired competences, which consist of a questionnaire with test questions and short answer questions. There will be four such tests during the course (20% of the final grade). In addition, as part of a final test that will take place at the end of the course, another test will be done on the whole subject, which will also consist of test questions and questions of Short answer (20% of the final grade).	45	A1 A2 A3 A4 A5	C1 C2	D1 D2 D3 D4 D5
Essay questions exam	Proof that will consist of theoretical questions and exercises that the student will respond by organizing and presenting, in an extensive way, the knowledge that has on the subject.	25	A1 A2 A3 A4 A5	C1 C2	D1 D2 D3 D4 D5
A test of this type will be done at the end of the course.					

Other comments on the Evaluation

Any student who, during the course, participates in tests of evaluation of two or more subjects of the program can not, in any case, obtain the qualification of NOT PRESENTED.

The students and students who do not exceed the subject in the ordinary call, and intend to do so in the extraordinary call, will keep the grades obtained during the course in each of the evaluation tests carried out, except the scores of the practical test of Matlab and the Two tests at the end of the course, which will be evaluated in the corresponding exam. Likewise, the grade of the solved exercises delivered during the course may be modified through a work supervised by the teaching staff (in this case, it will be necessary to contact the teaching staff well in advance).

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

Other comments

*Tutorías *individualizadas: The Mondays and Tuesday of 9:30 to 11:00 in the dispatch 28 of the first flat of the faculty of Sciences of the Sea. For *concertar another schedule of *tutoria, speak with the professor.

Contingency plan

Description

=== EXCEPTIONAL MEASURES SCHEDULED ===

In front of its uncertain and unpredictable evolution of the sanitary alert caused by the COVID-19, the University establishes joint extraordinary planning that will actuate in the moment in that the administrations and the @propio institution determine it attending to criteria of security, health and responsibility, and guaranteeing the *docencia in a @escenario no *presencial or no totally *presencial. These already scheduled measures guarantee, in the moment that was prescriptive, the development of the *docencia of a way but *áxil and effective when being known beforehand (or with a wide advance) pole students and the teaching staff through the tool normalized and institutionalized of the teaching guides DOCNE*T.

=== ADAPTATION OF The METHODOLOGIES ===

* teaching Methodologies that keep : Any

* teaching Methodologies that modify : The theoretical kinds the Seminars *realizaránse in the Virtual dispatch of the professor. The Practices with support of the TIC disappear.

* Mechanism no *presencial of attention to the students (*titorías): virtual Dispatch of the professor, previous petition by *mail to mbesada@uvigo.gal

* Modifications (proceed) of the contained to impart: No they modify

* additional Bibliography to facilitate to car-learning: Without variation

* Other modifications

=== ADAPTATION OF The EVALUATION ===

* Proofs already realized

Seminars : [previous Weight 25%] [Weight Proposed 30%]

* pending Proofs that keep : All

* Proofs that modify [Practical with support of the TIC] => [disappear]

* New proofs: None

IDENTIFYING DATA**Chemistry: Chemistry I**

Subject	Chemistry: Chemistry I			
Code	V10G061V01105			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Mosquera Castro, Ricardo Antonio			
Lecturers	Carreira Casais, Anxo Gómez Graña, Sergio Lorenzo Fernández, Paula Mosquera Castro, Ricardo Antonio Otero Martínez, Nicolás			
E-mail	mosquera@uvigo.es			
Web				
General description	The subject 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.			

Competencies

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.
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.

Learning outcomes

Expected results from this subject	Training and Learning Results			
- Chemical Nomenclature.	A1 A5	B4	C1 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 enthalpy, standard enthalpy, 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 calculación.	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	
Intermolecular Forces	Molecular geometry and polarity. Types of intermolecular forces: Electrostatic forces, inductive forces, dispersion forces, hydrogen bonding. Some properties of liquids.
Thermochemistry	Internal energy. Heat, work and first principle of thermodynamics. Enthalpy, standard enthalpy. Measure of heats of reaction: Calorimetry.
Chemical Equilibrium in Gas Systems	Chemical equilibrium. Equilibrium constant. Temperature dependence of equilibrium constant. Altering equilibrium: Le Châtelier principle.
Solubility Equilibrium	Solubility and solubility product constant. Altering solubility equilibrium: Common-ion effect. Equilibria involving complex ions.
Acid- Base Equilibrium	Theories of acids and bases. Scale of pH. Strong and weak acids and bases. Acid-base Equilibrium. Reactions of hydrolysis. Buffer solutions. Acid-Base reactions. Acid-Base titrations.
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.
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 subject. 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
Seminars	14	0	14
Laboratory practical	12	12	24
Lecturing	26	44	70
Autonomous problem solving	0	20	20
Essay questions exam	7	0	7
Report of practices, practicum and external practices	0	5	5
Problem and/or exercise solving	0	10	10

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

Methodologies

	Description
Seminars	The seminars will be mainly autonomous work of the student, under the supervision of the professor, and will be employed fundamentally for: - Resolution of problems, both, in individual way and in group. - When the student have worked the basic aspects, to stress about contents with more complexity.
Laboratory practical	Realization under the supervision of Professor (but of autonomous way) of laboratory practises related with the matter.
Lecturing	Theoretical lessons imparted under the basis of material the disposal of the students in the platform TEMA (schemes, exercises bulletins, etc). The teaching language will be Spanish
Autonomous problem solving	After each subject or group of topics the teacher will propose some "Assesable Exercises" that the students will have to solve and return to the teacher within the fixed period.

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 tutoring will be the no face-to-face concerted one. The student will have to make an appointment with the professor that have given the corresponding content. Because of the predictable circumstances for this course, tutoring will be preferably no face-to-face using remote campus or exchange of electronic messages.
Seminars	Those doubts/questions of the students that may arise along the course concerning the seminars will be solved in the tutoring schedule. The preferential modality for tutoring will be the no face-to-face concerted one. The student will have to make an appointment with the professor that had taught the corresponding exercise. Because of the predictable circumstances for this course, tutoring will be preferably no face-to-face using remote campus or exchange of electronic messages.
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 tutoring will be the no face-to-face concerted. The student will have to make an appointment with his lab professor. Given the predictable circumstances for this course, tutoring will be preferably no face-to-face using remote campus or exchange of electronic messages.
Autonomous problem solving	Those doubts/questions of the students that may arise along the course concerning the resolution of exercises, and/or other autonomous activities to be carried out, will be solved in the tutoring schedule. The preferential modality for tutoring will be the no face-to-face concerted one. The student will have to make an appointment with the professor that had proposed the corresponding activity. Because of the predictable circumstances for this course, tutoring will be preferably no face-to-face using remote campus or exchange of electronic messages. , will be resolved individually in the teacher tutoring schedule. In the present academic year schedule of tutorials will be Wednesdays and Thursdays at 9:00 to 12:00 hours and at 14:00 to 15:00. This schedule may vary promptly, when the teacher has other teaching, research or administrative obligations to meet. 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
Laboratory practical	<p>It is scored here along with the effort and the attitude, the skills and the competences developed by the student during the accomplishment of the different practices.</p> <p>Attendance at practice sessions is mandatory and, therefore, it is not possible to pass the subject in case it has not taken place.</p> <p>Learning outcomes:</p> <ul style="list-style-type: none"> - Definition of concepts such enthalpy, standard enthalpy, calorimetry, heat of dissolution and heat of reaction, and their calculation. - Definition of pH and pOH, acidity/basicity constant, constants, hidrólisis constnt, and their calculati3n. - Learn about buffer solutions and the different types of acid-base reactions and know how to use them. - To define reaction rate and rate equation, and know how to use. - Learn and know how to use the main methods of analysis of kinetic data. - To calculate the effect of the temperature in the reaction rate. 	15	A1 B4 C1 D1 A5 C6 D2
Essay questions exam	<p>Completion of a written examat the end of the semester, on the date fixed by the Xunta de Facultade.</p> <p>In addition, during the semester, on the date previously set by the teacher, an optional partial and releasing exam of topics I, II and III will be carried out. Students who achieve a grade of 4.0 or higher in the partial exam (which will have a weight of 28% in that case) will not have to be examined (if they wish) of that part of the Subject to the overall exam, only performing on that date an examination of the second partial (which will then have, in this case, a weight of 37%).</p> <p>Learning outcomes:</p> <ul style="list-style-type: none"> - All included in the subject. 	65	A1 C1 D1 A5 C6 D2

Report of practices, practicum and external practices	The formal aspects related to the organization, correct use of the units, correct preparation of the graphs and presentation of the results will be taken into account. Critical analysis of these and conclusions will also be assessed. Learning outcomes:	5	A1 A5	B4 C6	D1 D2
	<ul style="list-style-type: none"> - Definition of concepts such enthalpy, standard enthalpy, calorimetry, heat of dissolution and heat of reaction, and their calculation. - Definition of pH and pOH, acidity/basicity constant, constants, hidrólisis constnt, and their calculation. - Learn about buffer solutions and the different types of acid-base reactions and know how to use them. - To define reaction rate and rate equation, and know how to use. - Learn and know how to use the main methods of analysis of kinetic data. - To calculate the effect of the temperature in the reaction rate. 				
Problem and/or exercise solving	In addition to problem bulletins, at the end of each topic (or group of topics), we will propose "Assesable Exercises" that the students must solve autonomously and deliver to the teacher within the term that is fixed. Learning outcomes: - All included in the subject.	15	A1 A5	C1 C6	D1 D2

Other comments on the Evaluation

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.

In order to pass the subject, it is essential to reach a minimum of 4.0 points over 10 in the long exam (or in the global evaluation of the partial exams, each one with its percentage). In case of not achieving this score, the grade that will be reflected in the record will be only the grade of this exam (or the global evaluation of the partial exams), not taking account any of the other sections.

In order to pass the subject it is necessary to achieve **a minimum grade of 5.0 in the overall grade** (weighted sum of the long or partial exams (65%), laboratory practices (15%), practice reports The "Assesable Exercises" (15%)).

The performance of the partial exam, or the long exam, will imply the condition of "presented" and, therefore, the assignment of a grade in accordance with the included in this teaching guide.

Second Call:

For the evaluation in the second call, the grades and percentages of laboratory practices, practice reports and "Assesable Exercises" will be maintained.

In order to know exam dates: <http://mar.uvigo.es/index.php/en/alumnado-actual-2/examenes-3>

Sources of information

Basic Bibliography

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

ROSENBERG, J.L., "Química (serie Schaum)", (10ª edición), Ed. McGraw Hill, 2014

LÓPEZ CANCIO, J.A., "Problemas de Química: Cuestiones y Ejercicios", (1ª edición), Ed. Prentice-Hall, 2000

Complementary Bibliography

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

ATKINS, P.W., "Química: los caminos del descubrimiento", (5ª edición), Ed. Médica Panamericana, 2012

BROWN, T., LEMAY, E., "Química. La Ciencia Central", (12ª edición), Ed. Pearson Educación, 2013

REBOIRAS, M.D., "Química. La ciencia básica", Ed. Thomsom, 2006

LONG, G.G, HENTZ, F.C., "Química General: Problemas y Ejercicios", (3ª edición), Ed. Addison-Wesley Iberoamericana, 1991

WILLIS, C.J., "Resolución de Problemas de Química General", Ed. Reverté, 1980

LOGAN S. R., "Fundamentos de Cinética Química", Ed. Addison Wesley Iberoamericana, 2000

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

HARRIS, D. C., "Análisis Químico Cuantitativo", Ed. Reverté, 2001

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 nomenclature will be used very often resolving numerical problems and can be considered fundamental tools in this subject.

Contingency plan

Description

=== EXCEPTIONAL MEASURES SCHEDULED ===

In front of the uncertain and unpredictable evolution of the sanitary alert caused by the COVID-19, the University of Vigo establishes an extraordinary planning that will activate in the moment in that the administrations and the own institution determine it attending to criteria of security, health and responsibility, and guaranteeing the teaching in a no face-to-face stage or partially face-to-face. These already scheduled measures guarantee, in the moment that was prescriptive, the development of the teaching of a more agile and effective way when being known in advance by the students and professors through the tool normalised and institutionalised of the educational guides.

=== ADAPTATION OF THE METHODOLOGIES ===

* educational Methodologies that keep

The masterclasses and part of the ones of seminar will give through the remote campus or like recordings with link in "Tema" platform.

* Educational methodologies that modify

Part of the classes of seminar will be able to substitute by material deposited in "Tema" platform.

If they could not make the practices of laboratory would be substituted by videos, virtual practices, exercises or memories to elaborate. In this case, the students would be provided with the experimental data in order they write the corresponding report.

* Tutoring Mechanism no face-to-face of attention to the students

This attention was preferably no face-to-face.

* Modifications (if they proceed) of the contents to give

We will try not modifying the contents.

* Additional bibliography to facilitate the learning

It foresees that the student can use the texts recommended like basic to purchase all the knowledges given.

=== ADAPTATION OF THE EVALUATION ===

If only the short proof could be carried out in class, its weight would increase to 35% (in place of 28% foreseen in the guide).

If it was not possible to make the first proof in class, it would be suppressed and it would be exclusively a final examination (was this face-to-face or no face-to-face).

In case that the practices of laboratory could not be carried out, its weight would reduce to one half of the planned in the guide. The rest would increase the weight of the exercises proposed and other autonomous activities.

IDENTIFYING DATA				
Biology: Biology 2				
Subject	Biology: Biology 2			
Code	V10G061V01106			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	Spanish			
Department				
Coordinator	Souza Troncoso, Jesús			
Lecturers	Heres Gozalbes, Pablo 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.			

Competencies

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.

Learning outcomes

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 (*zooplankton, *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. *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	58	87
Seminars	7	15	22
Laboratory practical	5	10	15
Studies excursion	10	15	25
Objective questions exam	0.5	0	0.5
Essay questions exam	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.

Assessment

Description		Qualification Training and Learning Results			
Lecturing	They Will evaluate the contents with questions type test and/or short questions.	69	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.	10	A1	C9 C10 C11	D1 D2
Laboratory practical	It Will value the realization and participation in the practical.	15	A1	C9 C10 C11	D1 D2
Studies excursion	It Will evaluate the realization and the participation in the exits.	5	A1	C9 C10 C11	D1 D2
Objective questions exam	It will qualify the basic concepts in Zoology and Ecology.	0.5	A1	C9 C10 C11	D1 D2
Essay questions exam	It will qualify the basic concepts in Zoology and Ecology.	0.5	A1	C9 C10 C11	D1 D2

Other comments on the Evaluation

Date, time and place of exams will be published in the official web of Marine Sciences Faculty:
<http://mar.uvigo.es/index.php/en/alumnado-actual-2/examenes-3>

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

Recommendations

Other comments

The key to success is to take part in all activities.

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

* Teaching methodologies maintained

The same methodologies are maintained.

* Teaching methodologies modified

The methodologies have not been modified.

* Non-attendance mechanisms for student attention (tutoring)

Students will be attended by the teachers in their virtual offices by appointment request by e-mail.

* Modifications (if applicable) of the contents

The contents are not modified.

* Additional bibliography to facilitate self-learning

There are no changes.

* Other modifications

Not apply

=== ADAPTATION OF THE TESTS ===

* Tests already carried out

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

There are no pending tests.

* Pending tests that are maintained

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

There are no pending tests.

* Tests that are modified

[Previous test] => [New test]

They are not modified.

* New tests

We do not create new tests.

* Additional Information

If the state of alarm persists next year, the necessary measures will be adopted for the successful completion of the academic year.

IDENTIFYING DATA				
Statistics				
Subject	Statistics			
Code	V10G061V01107			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	1st	2nd
Teaching language	Spanish			
Department				
Coordinator	de Uña Álvarez, Jacobo			
Lecturers	de Uña Álvarez, Jacobo			
E-mail	jacobob@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.			

Competencies	
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.

Learning outcomes				
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	B4		
	A4			
	A5			
Understand the concept of hypothesis testing.	A3		C2	D1
	A5			
Understand the principles of multivariate analysis.	A3		C2	D1
	A5			
Effectively solve problems and issues of each of the lessons using the appropriate quantitative method.	A5	B2		D1
Introduce the students in the manage of computer packages related to statistics: excel, R. And so favor a positive attitude towards the quantitative methods, in general, and statistics, in particular, as well as their computer manipulation.	A3	B2		D1
	A5	B4		
Understand the importance of statistical analysis when taking decisions and learn when to apply each technique and interpret the results obtained.	A3	B2		D1
	A4			
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			D1
	A5			

Contents	
Topic	
1. Exploratory data analysis	Measures of central tendency, dispersion and form. Graphic representations. Linear and non-linear transformations. Atypical data and their detection.
	Mean and variance in subpopulations. Descriptive introduction to the ANOVA.

2. Calculation of probabilities and main distributions of probability	Random experiment. Rule of addition. Conditioned probability. Main probability theorems. Independence of events. Diagnostic tests. Discrete and continuous variables. Mean and variance. Discrete models: binomial, multinomial, hypergeometric and poisson. Continuous models: normal, log-normal, exponential, chi-square, t-Student and F-Snedecor.
3. Introduction to hypothesis testing. Tables of frequencies: measures and tests.	Definition of a test. Type I and type II errors, level of significance, p-value, power and sample size. Types of tests. Normality test. Frequency tables. Association measures for nominal, ordinal and quantitative variables. Measures of prediction and agreement. Chi-square test of goodness of fit, independence and homogeneity.
4. Regression	The simple linear model. Scatter plot. Line of regression. Correlation coefficient and goodness of fit. ANOVA of the regression and residue analysis. Non-linear regression: logarithmic, potential and exponential models. Introduction to multiple linear regression.
5. Statistical inference techniques for comparison of groups	Comparisons between 2 independent or related groups. Previous variance test: F test. Tests to compare two means: t tests. Comparison of more than 2 groups: ANOVA and multiple comparison test. Study of the assumptions of alternative nonparametric techniques.

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practical	15	7.5	22.5
Autonomous problem solving	0	27.5	27.5
Lecturing	30	30	60
Seminars	7	14	21
Problem and/or exercise solving	2	2	4
Essay questions exam	3	12	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	Data processing using the free software R.
Autonomous problem solving	Resolution of exercises in the problem sets.
Lecturing	Exposition of the main statistical techniques described in the syllabus of the subject.
Seminars	Resolution of practical exercises of the subjects. In some cases, Excel will be used.

Personalized assistance

Methodologies	Description
Seminars	In the tutorials and seminars.
Laboratory practical	In the tutorials and seminars.
Autonomous problem solving	In the hours of tutoring and seminars. The student who wishes can go to personalized tutoring to answer questions, mainly in the hours indicated. The student may set a different schedule by previously contacting the professor.

Assessment

	Description	Qualification	Training and Learning Results
Laboratory practical	The result of the analysis of data made during the practices will be uploaded to the faitic platform will be evaluated.	10	A3 A4 A5
Seminars	The students will be evaluated by solving an exercise in the classroom in an autonomous way.	10	A2 A3 A4 A5

Problem and/or exercise solving	There will be two midterm exams during the course that will take place during the theory classes.	20	A3 A5	C2	D1
Midterm 1 (10%): lessons 1 and 2. Midterm 2 (10%): lessons 3 and 4.					
Essay questions exam	Final exam of the subject	60	A3 A5	C2	D1

Other comments on the Evaluation

It is possible to pass the subject through continuous evaluation. The continuous assessment note is obtained as the weighted average of the following qualifications:

- Average grade of laboratory practice reports. (25%)
- Average grade of the exercises solved in the seminars. (25%)
- Average grade of the midterm exams. (50%)

If the subject is not passed through continuous assessment, the grade of continuous evaluation will represent 40% of the final grade, with the remaining 60% being the final exam grade in the official exams.

Date, time and place of exams will be published in the official web of Marien Sciences Faculty:

<http://mar.uvigo.es/index.php/en/alumnado-actual-2/examenes-3>

The grade in the extraordinary call is computed exactly in the same way as in the ordinary call. Counting the continuous evaluation (seminars, practices and partials) 40% and the final exam 60%.

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

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

Sokal R., Rohlf F., **Biometría**, 4, Blume, 2012

Steel R., Torrie J., **Bioestadística. Principios y procedimientos**, 4, McGraw-Hill, 1995

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

Complementary Bibliography

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

Recommendations

Contingency plan

Description

In the event of cancellation of face-to-face teaching, remote campus of the Universidade de Vigo will be used.

In these exceptional circumstances all the methodologies remain. Accompanying students will be performed through the remote campus (teacher's virtual office). The weights of the evaluation remain the same.

IDENTIFYING DATA				
Geology: Geology 2				
Subject	Geology: Geology 2			
Code	V10G061V01108			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	Spanish			
Department				
Coordinator	Rubio Armesto, María Belén			
Lecturers	Bernabéu Tello, Ana María Gago Duport, Luís Carlos Lago Cameselle, Alejandra Marino , Gianluca Pérez Arlucea, Marta María Rubio Armesto, María Belén			
E-mail	brubio@uvigo.es			
Web	http://http://mar.uvigo.es/index.php/es/alumnado-actual/asignaturas			
General description	Comprises the understanding of the scientific principles that influence our planet, its evolution, its formations, the atmosphere and the oceans. It is about acquiring basic knowledge of geological processes that act in particular on the earth's surface, the so-called external geological processes.			

Competencies

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.

Learning outcomes

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

Contents

Topic	
The Earth as an study object	Evolution of the Earth. The geological and petrologic cycle
The systems of the Earth	The systems of the Earth: atmosphere, hydrosphere, Hydrologic cycle. Karstic systems and underground water.
External Processes	Weathering and soils Formation of sediments Sediments: erosion, transport and sedimentatón. Diagenesis and sedimentary rocks
Geological processes in continental environments	Desert, glaciár, fluvial and lacustrian sedimentary environments

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practical	10	12	22
Seminars	7	10	17
Studies excursion	8	4	12
Lecturing	20	60	80
Report of practices, practicum and external practices	0	12	12
Objective questions exam	0	3	3
Essay questions exam	2	0	2
Essay	0	2	2

*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	Reconocimiento de rocas sedimentarias Sistemas de representación (mapas de isóneas y cálculo de volúmenes) Cortes geológicos
Seminars	Procesos de erosión y transporte de sedimentos. Determinación del contenido en carbonato cálcico en sedimentos Interpretación geológica con Google Earth
Studies excursion	Inspección geológica en una salida de campo el largo del itinerario : Vigo-Ramalloza-Baiona Se trata de reconocer el control que ejerce la geología y la dinámica marina y fluvial en la morfología de la costa. Reconocimiento de los principales tipos de rocas y de los principales ambientes sedimentarios; mecanismos de actuación durante el Cuaternario. Potenciales riesgos geológicos.
Lecturing	Clases centradas en contenidos teóricos con predominio de la exposición, pero fomentando la participación del estudiante mediante preguntas

Personalized assistance

Methodologies	Description
Seminars	The students could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables indicated. To optimize the time, it is necessary the student contact the teacher in advance.
Studies excursion	The students could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables indicated. To optimize the time, it is necessary the student contact the teacher in advance.
Lecturing	The students could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables indicated. To optimize the time, it is necessary the student contact the teacher in advance. B. Rubio schedule: Monday, Wednesday and Friday from 12:00 to 14:00 h.
Laboratory practical	The student that wish it will be able to *acudir the *tutorías customized to resolve doubts, mainly us time that indicate . To optimise the time, is necessary that the student contact with the in advance sufficient professor
Tests	Description
Report of practices, practicum and external practices	It corresponds to the final work that delivers the student and collects the work realized during them practical.

Assessment

	Description	Qualification	Training and Learning Results			
Seminars	It contemplates the delivery of the questions or resolution of the exercises posed in the seminars.	10	A1	B1	C1	D5
Studies excursion	It values the assistance to the routes of field programmed, and the corresponding presentation of a report or questionnaire on the contents evaluated in the exit.	5		B4	C1	C12
Report of practices, practicum and external practices	It will qualify the assistance and the correct realization of the practices of laboratory that have a mandatory character, in addition to the quality of the report	10	A1	B4		

Objective questions exam	It comprises the answers of the quizzes	5	A1	B1	C1 C12	D1
Essay questions exam	They will done in an only exam at the end of the course. It can contemplate any aspect of the theoretical lessons as well as in practical or seminars activities.	70	A1 A5	B1	C1 C12	

Other comments on the Evaluation

The quiz of the platform FAITIC and the practical lessons and seminars are compulsory. The minimum qualification of the theoretical examination will be of 3,5 to be able to compensate with the others qualifications obtained in practices and seminars.

Date, time and place of exams will be published in the official web of Marien Sciencies

Faculty: <http://mar.uvigo.es/index.php/en/alumnado-actual-2/examenes-3>

Students are strongly requested to fulfil a honest and responsible behaviour. It is considered completely unacceptable any alteration or fraud (i.e. copu 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

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

Pozo et al., **Geología Práctica**, Pearson,

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

Azañón et al., **Geología Física**, Paraninfo,

Complementary Bibliography

Recommendations

Subjects that continue the syllabus

Coastal and marine sedimentary habitats/V10G061V01207

Subjects that it is recommended to have taken before

Geology: Geology 1/V10G061V01103

Contingency plan

Description

=== EXCEPTIONAL MEASURES SCHEDULED ===

In front of it uncertain and unpredictable evolution of the sanitary alert caused by the COVID- 19, the University establishes join extraordinary planning that will actuate in the moment in that the administrations and the institution determine it attending to criteria of security, health and responsibility, and guaranteeing the teaching plan in a non-presential scenary. These already scheduled measures guarantee, in the moment that was prescriptive, the development of the teaching of a way but agile and effective when being known beforehand (or with a wide advance) pole students and the teaching staff through the tool normalized and institutionalized of the teaching guides DOCNET.

=== ADAPTATION OF The METHODOLOGIES ===

Teaching Methodologies that keep

The lectures will be in a virtual way through remote campus

Teaching Methodologies that modify

For the field contemplate two possible options, depending of the confinement level was total or partial.

(1) Option. Walking around campus. Geomorphologic description of the Ría de Vigo, since the forest park. Measurements of direction and dip with the compass.

(2) Option. Virtual tour using Google Earth and geological maps (MAGNA). Explanation of the tectonic and lithologic units of the NW and the coastal geomorphology. Analysis of weathering processes trough photographs. Video-tutorials about direction and dip measurements.

Regarding laboratory sessions:

The practice of recognition of sedimentary rocks will do virtually by using photographs of the collection of rocks of the Marine Sciences Faculty

The other two practices do not change.

Regarding the seminars will adapt to the virtual way. The seminars 1 and 3, that do not require the use of specific laboratory, will be the same. The seminar 2 will develop using a group of synthetic data from which the students will obtain the determination of calcium carbonate

Mechanism of no presential of attention to the students

All the mentoring will be concerted with the teaching staff and they will take place in a virtual mode

Modifications (proceed) of the contained to impart

They do not change

Additional Bibliography to facilitate the learning

* Other modifications

=== ADAPTATION OF The EVALUATION ===

Proofs already done

Test Seminars: [previous Weight 10%] [Weight Proposed 20%]

Practical Proof: [previous Weight 10%] [Weight Proposed 20%]

Test Field: [previous Weight 5%] [Weight Proposed 10%]

Test Questionnaires: [previous Weight 5%] [Weight Proposed 10%]

...

Pending proofs that keep

Test: [previous Weight 70%] [Weight Proposed 40%]

...

* Proofs that modify

[Test of short questions] => [test online]

* New proofs

We will include the participation in forums that can be evaluated for adjustment of the final mark.

* additional Information

IDENTIFYING DATA				
Mathematics: Mathematics II				
Subject	Mathematics: Mathematics II			
Code	V10G061V01109			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	Besada Morais, Manuel			
Lecturers	Besada Morais, Manuel			
E-mail	mbesada@uvigo.gal			
Web	http://fatic.uvigo.es			
General description	Basic course of integrate of line and surface and of equations *diferenciáis			

Competencies				
Code				
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy			
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.			

Learning outcomes				
Expected results from this subject		Training and Learning Results		
□ Understand the concepts of *rotacional and divergence of a field *vectorial. Comprise the importance of the integrals of line and surface and know used in the study of the potential energy and other physical questions.		A5	C1 C2	D2
□ Comprise, formulate and resolve any differential equations of first and second order.		A5	C1	D2
□ Use a program *informático in the resolution of problems related with the integral calculation and the differential equations.		A5	C1 C2	D2

Contents	
Topic	
Integral of line. Fields *conservativos	Regular curves. Integral along a curve. Work realized by a field. Fields *conservativos. *Rotacional. Divergence
Double integration. Surfaces.	Integration in *rectángulos. Integration in general areas. Change of variable. Polar coordinates. *Teorema Of *Green. Parametric and regular surfaces. Orientation of a surface.
Integral of surface. Integration @triple.	Integral of flow. *Teoremas Of Stokes. Integration @triple. Spherical coordinates and *cilíndricas. *Teorema Of *Gauss.
Differential equations of first order	Solution of a differential equation. Equations in separate variables. Exact equations. Linear equations.
Linear differential equations of upper order	Linear equations of order *n. Solutions. Linear equations with @constante coefficients. General solution of the equation *homoxénea. Particular solution of the complete equation.
*Temario Of laboratory	Resolution of exercises of integration and differential equations by means of programs of calculation.

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
Problem and/or exercise solving	5	10	15
Essay questions exam	2	10	12

Self-assessment	0	6	6
Problem and/or exercise solving	3	6	9

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

Methodologies	
	Description
Lecturing	Exhibition of the theoretical bases and resolution of exercises and basic examples.
Seminars	Activities focused to the *trabajo individual or in group of the student in the resolution of problems that allow *afondar or enlarge the contents of the discipline. They Will employ how supplement of the theoretical kinds.
Practices through ICT	Learning of the handle of one plan *informático of calculation and graphic representation.
Autonomous problem solving	Activity in that formulate problems and exercises related with the discipline. The students owes to resolved by means of the methods accommodated to the available information and interpret the results.
Collaborative Learning	Specific activities of work in group.

Personalized assistance	
Methodologies	Description
Seminars	The students will sue to the professor the clarifications that estimate opportune to comprise better to subject and develop successfully the tasks proposed. *Faráse Also a tracking of the individual work of the student.
Practices through ICT	The students will sue to the professor the clarifications that estimate opportune to comprise better to subject and develop successfully the tasks proposed. *Faráse Also a tracking of the individual work of the student.
Collaborative Learning	The student that wish it will be able to *acudir the *titorías customized to resolve doubts. To optimise the time, is necessary that the student contact with the in advance sufficient professor by *mail.
Tests	Description
Problem and/or exercise solving	The student that wish it will be able to *acudir the *titorías customized to resolve doubts. To optimise the time, is necessary that the student contact with the in advance sufficient professor by *mail.

Assessment		Qualification	Training and Learning Results		
	Description				
Practices through ICT	The *estudiantes owe to resolve any exercises with the plan *informático used in the sessions of laboratory.	5	A5	C2	D2
Problem and/or exercise solving	During it study will realize partial proofs with questions type test and/or of short answer.	25		C1 C2	D2
Essay questions exam	When finalizing the course *realizaráse a final proof with questions that will be able to be type test, of short answer and/or problems. It Will be requirement *imprescincible surpass in a 30% the qualification of this proof to approve the subject.	45	A5	C1 C2	D2
Problem and/or exercise solving	Exhibition or delivery in the classroom in the that the *estudiantado owes to solve a series of low problems the conditions and the time established pole professor.	25	A5	C1 C2	D2

Other comments on the Evaluation

- The date, time and location of the assessment tests will be published on the official website of the Faculty of Marine Sciences: <http://mar.uvigo.es/index.php/gl/alumnado-actual/examenes-2>
- A partial test may be carried out, which may release material from the final test.
- To pass the subject, the following requirements will be essential:
- - Exceed 30% of the final test grade.
- -Get 50% of the grade in the sum of the grades for all sections.
- Any student who, during the course, participates in evaluation tests of two or more subjects of the program will not be able, in any case, to obtain the grade of NOT PRESENTED.
- 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 in each of the assessment tests carried out, except for the qualifications of

practices with the support of ICT and the two tests taken at the end of the course, which will be evaluated in the corresponding exam. Likewise, the qualification of the resolved exercises delivered during the course may be modified through a work supervised by the teaching staff (in this case, it will be necessary to contact the teaching staff well in advance to specify the work to be done).

- 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 suspending the subject for a full course. An internal record of these actions will be kept to, in the case of recidivism, request the rector to open a disciplinary file.

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.; Edwards, B., **Cálculo. Vol 1 e 2.**, 9ª, 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 *bacharelato.

Contingency plan

Description

=== EXCEPTIONAL MEASURES SCHEDULED ===

In front of it uncertain and unpredictable evolution of the sanitary alert caused by the COVID- 19, the University establishes join extraordinary planning that will actuate in the moment in that the administrations and the @propio institution determine it attending to criteria of security, health and responsibility, and guaranteeing the *docencia in a @escenario no *presencial or no totally *presencial. These already scheduled measures guarantee, in the moment that was prescriptive, the development of the *docencia of a way but *áxil and effective when being known beforehand (or with a wide advance) pole students and the teaching staff through the tool normalized and institutionalized of the teaching guides DOCNE*T.

=== ADAPTATION OF The METHODOLOGIES ===

* teaching Methodologies that keep : Any

* teaching Methodologies that modify : The theoretical kinds the Seminars *realizaránse in the Virtual dispatch of the professor. The Practices with support of the TIC disappear.

* Mechanism no *presencial of attention to the students (*titorías): virtual Dispatch of the professor, previous petition by *mail to mbesada@uvigo.gal

* Modifications (proceed) of the contained to impart: No they modify

* additional Bibliography to facilitate to car-learning: Without variation

* Other modifications

=== ADAPTATION OF The EVALUATION ===

* Proofs already realized

Seminars : [previous Weight 25%] [Weight Proposed 30%]

* pending Proofs that keep : All

* Proofs that modify [Practical with support of the TIC] => [disappear]

* New proofs: None

IDENTIFYING DATA				
Chemistry: Chemistry 2				
Subject	Chemistry: Chemistry 2			
Code	V10G061V01110			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	Spanish			
Department				
Coordinator	Graña Rodríguez, Ana María			
Lecturers	Correa Duarte, Miguel Ángel Estévez Guance, Laura Graña Rodríguez, Ana María Mariño López, Andrea Prieto Jiménez, Inmaculada			
E-mail	ana@uvigo.es			
Web				
General description				

Competencies	
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.

Learning outcomes				
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	
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.
Thermodynamic functions	Gibbs and Helmholtz functions. Gibbs equations. Calculation of changes in state functions. Partial molar magnitudes. Chemical potential.
Phase equilibrium in one-component system	Phase equilibrium conditions. The phase rule. Phase diagram of water. The equations of Clapeyron and Clausius-Clapeyron.
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.

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	Enthalpy of dissolution. Method of solubility: enthalpy. 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. Ebullioscopic 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	27	50
Seminars	14	42	56
Laboratory practical	15	5	20
Essay questions exam	4	8	12
Problem and/or exercise solving	2	10	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 TEMA website). 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 also available in the TEMA website.
Seminars	Destined to the resolution of numerical problems and debate of the questions and exercises. The necessary material will be available in the TEMA website.
Laboratory practical	Application of techniques of laboratory in practical problems related with the subject.

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

Assessment

Description	Qualification	Training and Learning Results
Laboratory practical Attendance required. Continuous assessment during class hours.	15	B4 D2

Essay questions exam	Written exams in which the level of theoretical knowledge and problem solving will be checked. Two optional partial exams will be made in the middle of the semester and at the end of it. The final grade will be the average of the one obtained in the two partial ones, provided that a minimum of 4 out of 10 is achieved in both. Alternatively, the student may submit to the final exam with all subject matter. The final exam grade must correspond to a minimum performance, which is set at 4 out of 10.	70	A1 A5	B4	C6	D1 D2
Problem and/or exercise solving	Resolution of problems at home and/or individual resolution of questionnaires in the TEMA website.	15	A1		C6	D1 D2

Other comments on the Evaluation

If the exam score (or the average of the two partial examinations) is lower than 4 out of 10, the final grade will be the one obtained in the exams.

Date, time and place of exams will be published in the official web of Marien Sciences Faculty:

<http://mar.uvigo.es/index.php/en/alumnado-actual-2/examenes-3>

In the call of Julio the previous percentages will be respected, and the obtained qualifications obtained in practices and resolution of questions are maintained.

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

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, **Termodinámica Química**, 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 Wiley & Sons (1995).,
D. Eisenberg e D. Crothers, **Physical Chemistry with Applications to the Life Sciences**, 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

Contingency plan

Description

=== EXCEPTIONAL MEASURES SCHEDULED ===

In front of its uncertain and unpredictable evolution of the sanitary alert caused by the COVID-19, the University establishes an extraordinary planning that will actuate in the moment in that the administrations and the institution determine it attending to criteria of security, health and responsibility, and guaranteeing teaching in a scenario partial or totally. These already scheduled measures guarantee, in the moment that is prescriptive, the development of teaching in a quick and effective way previously known by students and teaching staff through doctnet tool.

=== ADAPTATION OF THE METHODOLOGIES ===

* Methodologies that stay the same

Lecturing (partial or totally virtual)

Seminars (partial or totally virtual)

* Methodologies that modify

Laboratory practical : they will be partial or totally substituted by videos and documents that allow the presentation of a report.

* Mechanism for virtual attention to the students (tutorial sessions)

Remote Campus, email and fatic.

* Modifications of the contained to impart:

None.

* Additional Bibliography to facilitate to car-learning:

None.

* Other modifications:

None.

=== ADAPTATION OF THE EVALUATION ===

Essay questions exams will be substitute total or partially by tests through fatic with the same percentage of the qualification.

The resolution of problems and/or exercises remains with the same percentage of the qualification.

Continuous assessment during practical class hours will be substituted total or partially by the delivery of reports of practices.

* Additional information

None
