



IDENTIFYING DATA

Chemical oceanography I

Subject	Chemical oceanography I			
Code	V10G061V01204			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	1st
Teaching language	Spanish			
Department				
Coordinator	Prieto Jiménez, Inmaculada			
Lecturers	Otero Martínez, Nicolás Prieto Jiménez, Inmaculada Ramos Berdullas, Nicolás			
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Web				
General description				

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
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
B1	Know and use vocabulary, concepts, principles and theories related to oceanography and apply everything learned in a professional and/or research environment.
B3	Recognize and implement good practices in measurement and experimentation, and work responsibly and safely both in field surveys and in the laboratory.
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.
C7	Apply to the marine and coastal environment the principles and methods used in Chemistry.
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			
	A2	B1	C6	D1
Describe the composition and behavior of materials present in seawater.	A2	B1	C6	D1
	A4		C7	D2
Explain the main properties of water, electrolyte solutions and seawater from a physicochemical point of view.	A2	B1	C6	D1
	A4			D2
	A5			
Recognize and interpret the transport phenomena of solutes.	A2	B1	C6	D1
	A4		C7	D2
	A5			
Distinguish the types of estuaries based on water circulation and identify their characteristics.	A2	B1	C6	D1
	A5		C7	D2
Use quantitative models to study the water circulation and calculate residence times in estuaries.	A2	B1	C6	D1
	A5	B4	C7	D2

Explain the characteristics of the air-sea interface, the processes that take place and the factors that control them.	A2 A4 A5	B1	C6 C7	D1 D2
Describe the gas solubility in the seawater and apply the models to estimate gas exchange across the air-sea interface.	A2 A4 A5	B1	C6 C7	D1 D2
Explain the characteristics of the seawater-solid interface, the processes that occur in it and identify the factors that determine them.	A2 A4 A5	B1 B3 B4	C6 C7	D1 D2
Interpret the properties and behavior of particulate matter and colloids present in seawater.	A2 A5	B1 B3 B4	C6 C7	D1 D2
Use appropriate experimental techniques to study the adsorption processes and apply the models at the solid-solution interface.	A2	B1 B3 B4	C7	D1 D2
Explain the characteristics and composition of interstitial waters.	A2 A4 A5	B1	C6 C7	D1 D2

Contents

Topic

1. Composition and physicochemical properties of seawater.	- Introduction. - Ion-solvent interactions. - Ion-ion interactions. - Physicochemical properties of seawater. - Salinity.
2. Transport phenomena.	- Non-ionic transport phenomena: Heat conductivity, viscosity and diffusion. - Advection-diffusion equation. - Electrical conductivity.
3. Mixing processes in coastal systems.	- Introduction. - Estuaries: Classification and types. Description. - Mixing processes in estuaries: Models. Quantitative models.
4. Liquid-gas interface.	- Interfacial thermodynamics: Surfaces and interfaces. Surface tension. Superficial excess. - Gas solubility in seawater. - Models for estimating gas exchange at the gas-liquid interface. - Nonconservative gases. - Oxygen in seawater. - Alkalinity of natural waters.
5. Solid-liquid interface	- Introduction. - Double layer. Models. - Adsorption at the solid-liquid interface: Physisorption and chemisorption. Adsorption isotherms. - Behavior of particulate and colloidal material in sea water. - Diagenesis and interstitial waters.
Laboratory experiment 1	Determination of physicochemical properties of water in the Vigo Estuary
Laboratory experiment 2	Determination of the surface tension of organic compounds and influence of related factors.
Laboratory experiment 3	Study of adsorption from solution at the solid-liquid interface.
Laboratory experiment 4	Study of properties of colloidal systems.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	23	35	58
Problem solving	14	28	42
Laboratory practical	15	20	35
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
Lecturing	Classes in which the faculty gives a global vision of the contents of the subject, focusing in a special way on the most relevant aspects and that are more difficult to understand for the students. The material will be placed in Tema platform.

Problem solving	<p>Activity where it is exposed some aspects related to the development of the topics covered in the subject, also solving problems, exercises and / or issues.</p> <p>In addition, the students must work on proposed exercises and issues, according to the guidelines established by the professor in the classes or seminars of the subject.</p>
Laboratory practical	<p>The students will perform different experiments in the laboratory over several sessions. In order to be able to have previous knowledge of the practices to be carried out, students will have the corresponding material on the Tema platform.</p> <p>After working in the laboratory, students must prepare a report, which must include the results obtained, discussion and conclusions related to the practice.</p> <p>Once it is finished, students will have to answer some questions related to the work developed.</p>

Personalized assistance

Methodologies	Description
Lecturing	Sessions in which the faculty will resolve the questions and queries of the students related to the study and / or subjects related to the subject and the activities developed during the course. The students who want to be able to go to personalized tutorials, specially in the schedule indicated below. Hours: Tuesday, wednesday and thursday, from 15:30 to 17:30 h. This schedule may vary on time, depending on other teaching and / or research duties that the faculty must attend, so it would be convenient for the student to contact in advance.
Laboratory practical	Idem
Problem solving	Idem
Tests	Description
Essay questions exam	Idem

Assessment

	Description	Qualification	Training and Learning Results		
Problem solving	<p>The problems, exercises and/or questions proposed will be evaluated, according to the guidelines established by the professor in the classes or in the seminars of the subject.</p> <p>Attendance at the seminars is mandatory.</p> <p>The student should achieve at least 40% of the maximum score to consider this section in the overall rating.</p>	20	A2 A4	C6	D2
Laboratory practical	<p>In this section will be valued:</p> <ul style="list-style-type: none"> - The work carried out by the students in the laboratory. - The report on the laboratory experiments carried out by the students. - Test about the work developed. <p>Attendance at laboratory experiments is mandatory.</p> <p>To overcome the subject the student should reach at least 50% of the maximum possible score for this activity.</p>	20	A2 A4	C6	D2
Essay questions exam	<p>Written tests to evaluate skills acquired throughout the course.</p> <p>It will be valued:</p> <ul style="list-style-type: none"> - A midterm exam, no eliminatory (15%) - The final exam (45%) <p>The qualification will be the ponderated sum of the obtained in the two exams. To pass the subject, a minimum grade of 3,5 points (of 10) must be achieved.</p>	60	A2 A4 A5	C6	D2

Other comments on the Evaluation

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

The final grade of the subject at the end of the semester will be the sum of all the sections that make up the evaluation, provided that the required minimums are exceeded. If this is not the case, the qualification will be that of "Question exam".

The final grade, if higher than 7 points, can be normalized so that the highest grade can be up to 10 points.

In July

In the call for the subject in July, the evaluation system will be similar, maintaining the grades obtained by the students through the problems and/or issues solving during the course and the laboratory experiments.

In July, students may retrieve the section corresponding to the written tests (60%). To pass the subject a minimum grade of 3.5 points (of 10) must be achieved.

The final grade will be the sum of all the sections, as long as the required minimums are exceeded. If it is not the case, the qualification that will appear in the record will be that of the weighted final test.

In the case that this qualification in the July is lower than that obtained in the evaluation at the end of the term, the qualification that will appear will be the latter.

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

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

Finally, 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

P.W. ATKINS, "Química Física", 8ª Ed., Editorial Médica Panamericana, 2008

S. M. LIBES, "Introduction to Marine Biogeochemistry", 2ª Ed., Academic Press, 2009

Complementary Bibliography

I.N. LEVINE, "Principios de Físicoquímica", 6ª Ed., Mc Graw Hill Interamericana, 2014

F. J. MILLERO, M. L. SOHN, "Chemical Oceanography", 4ª Ed., CRC Press, 2013

J. P. RILEY, R. CHESTER, "Chemical Oceanography", Academic Press, 1989

Recommendations

Subjects that continue the syllabus

Chemical oceanography II/V10G061V01209

Subjects that it is recommended to have taken before

Chemistry: Chemistry I/V10G061V01105

Chemistry: Chemistry 2/V10G061V01110

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.

SEMIPRESENTIAL TEACHING

=== ADAPTATION OF THE METHODOLOGIES ===

* Teaching methodologies maintained

Master class (partially or completely virtual, through Remote Campus)

Seminars (in person)

Laboratory practices (in person)

* Teaching methodologies modified

None

* Non-attendance mechanisms for student attention (tutoring)

If possible, tutoring can be done both in person and online, via email, Campus Remoto and FAITiC with prior agreement.

* Modifications (if applicable) of the contents

None

* Additional bibliography to facilitate self-learning

None

* Other modifications

None

=== ADAPTATION OF THE EVALUATION ===

If it is not possible to take them in person, the exams with questions to develop may be replaced in whole or in part by tests through FAITiC and Remote Campus, maintaining the percentage of the grade.

Problem solving and / or exercises will be maintained with the same percentage in the final grade.

The evaluation of laboratory practices will maintain his contribution to the final qualification.

* Additional Information

None

ONLINE TEACHING

=== ADAPTATION OF THE METHODOLOGIES ===

* Teaching methodologies maintained

Master class (partial or totally virtual, through Remote Campus)

Seminars (partial or totally virtual, in Remote Campus)

* Teaching methodologies modified

Laboratory practices: they will be partial or totally substituted by videos and explanatory documents that allow the work on practices, and the presentation of a report of the same.

* Non-attendance mechanisms for student attention (tutoring)

Students tutoring will be realised by email, Remote Campus and FAITiC, under the modality of concertación previous.

* Modifications (if applicable) of the contents

None

* Additional bibliography to facilitate self-learning

None

* Other modifications

None

=== ADAPTATION OF THE EVALUATION ===

The exams will be substituted total or partially by test through FAITiC and Remote Campus, keeping the percentage of the qualification.

The resolution of problems and/or exercises will be supported by the same percentage.

In the practices, the evaluation of the laboratory work will substituted total or partially by reports of laboratory practices.

* Additional Information

None
