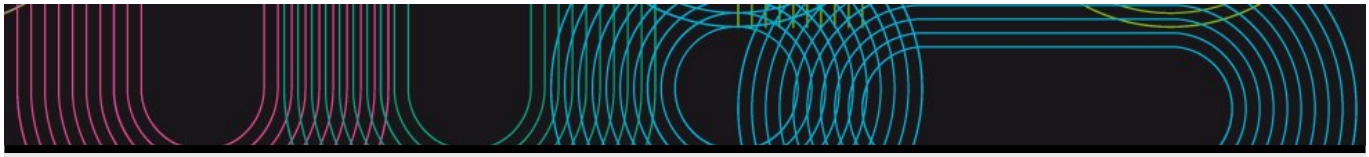

IDENTIFYING DATA				
Chemical oceanography II				
Subject	Chemical oceanography II			
Code	V10G061V01209			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	Spanish			
Department				
Coordinator	Nieto Palmeiro, Óscar			
Lecturers	Calle González, Inmaculada de la Leao Martins, Jose Manuel Nieto Palmeiro, Óscar			
E-mail	palmeiro@uvigo.es			
Web	http://http://depc07.webs.uvigo.es/			
General description	In this matter presents the chemical methodology applied to the determination of the compounds of greater interest in the Chemical Oceanography, from the taking of sample until the obtaining of the final result.			

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
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.
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			
Describe the foundations and the applications of the technicians of chemical analysis more usually used in the laboratory.	A2 A4	B1 B2 B3	C6 C7	D1
Know choose and use the material for the taking of sample of the water of mar.	A2 A4	B1 B2 B3	C6 C7	D1 D2
Apply the technicians of chemical analysis to the compounds of greater interest in the Chemical Oceanography.	A2 A4	B1 B2 B3 B4	C6 C7	D1 D2

Apply the experimental conditions more adapted for the determination of a chemical compound in function of the chemical reactivity.	A2 A4	B1 B2 B3 B4	C6 C7	D1 D2
Know realise all the necessary calculations to determine the final concentration of a compound in the water of sea in function of the analytical technician used.	A2 A4	B1 B2 B3 B4	C6 C7	D1 D2
Prepare the reagents and the necessary material to carry out an oceanographic campaign.	A2 A4	B1 B2 B3	C6 C7	D1 D2

Contents

Topic	
Analytical methodology (I): previous operations	Sampling. Preparation of the sample. Measurement and analytical chemistry references. Analytical measurment techniques.
Analytical methodology (II): measurement techniques.	Gravimetric and volumetric methods. Instrumental techniques of analysis.
Analytical methodology (III): measure and chemical references-analytical.	Accuracy and precision. Limits of confidence. Quality assurance in the analytical measurement.
Determination of salinity in seawater other major compounds	Determination of the salinity: chlorinity and chlorosity. Determination of major anions and cations.
Alcalinity of seawater	Buffering capacity and alcalinity. Determination of the total alcalinity in seawater.
Dissolved oxygen	Determination of dissolved oxygen in seawater. Relation between dissolved oxygen and other physico-chemical parameters.
Nutrients: species of N, P, Si	Determination of nitrates, nitrites and ammonium in the half marine. Methods of determination of phosphates: relation of the concentrations N/P. Determination of the concentration of silicate.
Organic matter in the oceans	Determination of humic substances and photosynthetic pigments.
Trace metals	Total determination of trace elements in the marine environment.

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	0.5	0.5	1
Lecturing	20.5	46	66.5
Problem solving	9	20.5	29.5
Laboratory practical	18	0	18
Mentored work	3.5	0	3.5
Presentation	0.5	0	0.5
Essay questions exam	1.5	0	1.5
Problem and/or exercise solving	1.5	0	1.5
Report of practices, practicum and external practices	0	18	18
Essay	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
Introductory activities	In this activity will present them to the students the syllabus to develop during the semester, as well as the aims, competitions and criteria of evaluation. Likewise it will explain them the form to develop the subject along the semester, will create the groups that will make the integrated methodologies.
Lecturing	During the teaching of each subject, the students will have in the platform TEMA, before the session of classroom, of ones aim on the syllabus to treat in the session of classroom. The professor will expose the syllabus in the classroom and will make a series of questions to promote the critical thought during the session of classroom. You aim them they will leave to be available in the platform TEMA a week after having finalised the teaching of the matter.
Problem solving	During the sessions in the classroom devoted to "Resolution of problems", the students will learn to calculate concentrations of compounds of oceanographic interest in seawater from data that obtained usually at the laboratory. The billed of these problems will find in the platform TEMA with some possible answers that will help to the students to autoevaluate.

Laboratory practical	The students will make practices of laboratory on determinations of characteristic chemical parameters of the water of sea as well as of compound chemists of interest in chemical oceanography. The reports of practical have to be delivered in the time stipulated, be original and will be evaluated by the professor of agreement to some criteria of evaluation published in the platform TEMA. They do not have obligation to make these practices those students that made them during the course 2018-19 and obtained an upper qualification to 5 points.
Mentored work	The students will make an original project related with an exit in ship to make a study of chemical oceanography. The project will be evaluated by the professor of agreement to some criteria of evaluation published in the platform TEMA. They do not have obligation to make this work those students that made it during the course 2018-19 and obtained an upper qualification to 5 points.
Presentation	The students will do a brief presentation in public on the project made in the Supervised Work which will be evaluated by the professor and his mates of agreement to some criteria of evaluation published in the platform TEMA. They do not have obligation to make this presentation those students that made it during the course 2018-19 and obtained an upper qualification to 5 points.

Personalized assistance

Methodologies	Description
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 requested to previously contact his/her teacher with reasonable anticipation. Any doubt that arise to the student can consult any doubt through the forums enabled for this purpose in the platform TEMA.
Mentored work	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. Any doubt that arise to the student can consult any doubt through the forums enabled for this purpose in the platform TEMA.
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Presentation	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. Any doubt that arise to the student can consult any doubt through the forums enabled for this purpose in the platform TEMA.
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. Any doubt that arise to the student can consult any doubt through the forums enabled for this purpose in the platform TEMA.
Problem solving	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. Any doubt that arise to the student can consult any doubt through the forums enabled for this purpose in the platform TEMA.

Assessment

	Description	Qualification	Training and Learning Results
Laboratory practical	The practices of laboratory are compulsory for all the students and will evaluate in accordance with the work realised during the sessions of laboratory and the memory of practices realised of agreement to some criteria of quality published in the platform TEMA.	5	A2 B1 C6 D1 A4 B2 C7 D2 B3 B4
Presentation	The presentation of the project realised during the tutored works will be evaluated by the professor of agreement to some criteria established previously published in the platform TEMA.	7.5	A2 B1 C6 D1 A4 B2 C7 D2 B4
Essay questions exam	In the final examinations, the pupils will have to answer to a series of questions where the aptitude to summarize will be evaluated, outlining and describing in a succinct way the analytical procedures for the determination of the compounds of major interest for the accomplishment of an oceanographic study or some analytical process. The examination will consist of 5 questions of this type.	25	A2 B1 C6 D1 A4 B2 C7 D2 B3

Problem and/or exercise solving	When finalising each block of subjects, will realise an examination written with an exercise on the calculation of the concentration using a method of chemical analysis. It will evaluate the result obtained, as well as the clarity and the reasoning used to arrive to this. The final examination will consist in the resolution of three problems of this type.	25	A2 B1 C6 D1 A4 B2 C7 D2 B3 B4
Report of practices, practicum and external practices	The work of laboratory and the memory of practices will be evaluated by the professor according to some previously established criteria published in the platform TEMA. The final note of the Practices of Laboratory will obtain from the geometrical average of the qualifications obtained in each one of the laboratory practices. In case that the work was not original (was copy of another work or of the network), the professor will not evaluate said work.	20	A2 B1 C6 D1 A4 B2 C7 D2 B3 B4
Essay	The reports presented in the Tutorized Works will be evaluated by the professor according to some previously established criteria published in the platform TEMA. The final note of the Tutorized Works (seminars) will be obtained from the geometrical average of the qualifications obtained in each one of the reports made. In case that the work was not original (was copy of another work or of the network), the professor will not evaluate said work.	17.5	A2 B1 C6 D1 A4 B2 C7 D2 B3 B4

Other comments on the Evaluation

The date, hour and place to carry out the exams will be published in the official web of the Faculty of Marine Sciences:http://mar.uvigo.es/index.php/es/alumnado-actual/examenes

The subject consists of four big main blocks and the qualification of each one of them will be considered with 25% on the final note:

1.- Theoretical Questions (Proofs of development, 25%). To consider surpassed this exam, the students should obtain a qualification of equal or upper to 5 points.

2.- Problems and/or exercises solving. To consider surpassed this proof, the students shlould obtain a qualification of equal or upper to 5 points.

3.- Works of seminars . This incudes the Essay (17,5%) and the Presentation (7,5%) following some criteria that will be published in the platform TEMA. To consider surpassed this proof, the students shlould obtain a qualification of equal or upper to 5 points.

4.- Laboratory Practices. This includes the work made at the laboratory (5%) and the corresponding report of practices (20%) following some criteria that will be published in the platform TEMA. The mean value of this qualification will be calculated as the geometrical average of the qualifications obtained in each one of the practices. To consider surpassed this proof, the students should that obtain a qualification of equal or upper to 5 points.

To approve the subject, it will be necessary to surpass with a minimum qualification of 5 points on 10 in all and each one of these blocks.

In case of not reaching the minimum qualification in the blocks 1.- And/or 2.-, the students will make again the part of the no surpassed examination in the announcement of 2nd opportunity.

In case of not reaching the minimum qualification in the blocks 3.- And/or 4.-, the students will send again the works with the pertinent corrections in the terms and date estimated by the corresponding professor.

When a student the student carries out any proof of which show in the previous table, this will be taken into account immediately for the final qualification and stated in the record like student presented in the corresponding announcement.

Any injustified absence to one of the sessions of seminars and/or laboratory practices, blocks 3.- And 4.-, supposes the no evaluation of the corresponding block and will be repeated in the following course.

It requires that the students curse this matter a responsible and honest behaviour.

It considers inadmissible any form of fraud (i.e. copies and/or plagiarism) directed to fake the level of knowledge or skill reached by a/to student/to in any type of proof, report or work designed with this purpose. This fraudulent behaviour will be sanctioned with the firmness and rigour that establishes the valid rule.

In case of not surpassing the matter, the qualifications that will be conserved, in the caso of being surpassed, for the following curse will be the following:

- Presentations/exhibitions

- Laboratory

- Inform/memories of practices

- Works and projects

Sources of information

Basic Bibliography

Grasshof K., Kremling K., Ehrhardt M. (Eds.), **Methods of Seawater Analysis**, 3, Wiley,

Aminot A., Kérouel R. (Eds.), **Hydrologie des écosystèmes marins: paramètres et analyses**, Editions Quae,

Harris D.C., **Análisis Químico Cuantitativo**, Reverté,

Millero F.J., Sohn M.L., **Chemical Oceanography**, CRC Press,

Complementary Bibliography

Aminot A., Chaussepied M. (Eds.), **Manuel des Analyses Chimiques en Milieu Marin**, CNEXO,

Parsons T.R., Maita Y., Lalli C.M., **A Manual of Chemical and Biological Methods of Seawater Analysis**, Pergamon Press,

Skoog D.A., West D.M., Holler F.J., (Crouch S.R.), **Fundamentos de Química Analítica**, McGraw-Hill o Reverté,

Beiras R., Pérez S. (Eds.), **Manual de métodos básicos en contaminación acuática**, Universidade de Vigo,

Gianguzza A, **Marine chemistry: an environmental analytical chemistry approach**, Springer,

Chester R., **Marine Geochemistry**, 2, Blackwell Science,

Bearmean G. (ed.), **Sewater: its composition, properties and behaviour**, 2, The Open University. Pergamon Press,

Horwitz W., Latimer G.W., **Official methods of analysis of AOAC International**, 18, AOAC International, cop.,

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

Burriel F., Lucena F., Arribas S., Hernández J., **Química Analítica Cualitativa**, 14, Paraninfo,

Recommendations

Subjects that continue the syllabus

Chemistry applied to the marine environment II/V10G060V01604

Subjects that it is recommended to have taken before

Chemistry: Chemistry I/V10G061V01105
Chemistry: Chemistry 2/V10G061V01110
Chemical oceanography I/V10G061V01204

Other comments

It is assumed that the students, before the beginning of the subject, have a good knowledge on the following concepts of chemistry:

- formulation and chemical nomenclature
- calculation of concentrations
- balance of basical chemical reactions and calculation of stoichiometric ratios

Likewise, it is also assumed that the students have capabiliity to learn by themselves to handle a scientific calculator, especially regarding the calculation of basic statistical parameters and the adjust of a linear plot by least squares.

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 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 or no totally face-to-face stages. 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 in advance (or with a wide anticipation) by the students and the professors through the tool normalised and institutionalised of the educational guides DOCNET.

Two different possibilities are envisaged , given the possibility of a complication of the epidemic

- A teaching scenario , semi face-to-face' (remote theory, practices and face-to-face seminars)
- Teaching not in person (all in remote)

=== ADAPTATION OF The METHODOLOGIES ===
* educational Methodologies that keep

Those that already have been made.

* educational Methodologies that modify

- Practical of laboratory
The practices of laboratory that can not do in face-to-face way will make in shape of simulation through the virtual classroom (Remote Campus) that the University of Vigo has the disposal of the professors and of the students. After the session of virtual classroom, will have to present the corresponding report of agreement to the criteria and indications of the professors of practices.

- Introductory Activities:
- Magistral Lesson:
- Resolution of problems:
- Supervised Works:
- Presentation of works:
The sessions of these activities that cannot make presentially, will make through the virtual classroom that the University of Vigo has the disposal of the professors and of the students.

* Mechanism no face-to-face of attention to the students (*tutorías)

Will be able to make personal tutories, previous appointment by email, in the virtual office of the professors:
Óscar Nieto: Sala 1752
José Manuel Leao: Room 1362
Inmaculada de la Calle: Room 356

In the platform TEMA is enabled the section of Forums, where will be opened a forum for each subject of classroom given, as well as several forums for the practices of laboratory, classes of problems and seminars. Of this way, the students will be able to do the questions that will be able to be answered so much by the professors as by the/the mates/the ones of class.

* Modifications (proceeds) of the contents to give

Does not proceed

* additional Bibliography to facilitate to car-learning

Will employ web pages and videos related to complement the training of the students. This information will be available in the platform TEMA.

* Other modifications

Does not proceed

=== ADAPTATION OF The EVALUATION ===
* Test already made
Proof *XX: [previous Weight 00%] [Weight Proposed 00%]

Does not proceed

* pending Proofs that keep

- Resolution of problems and/or exercises: through the tool of Moodle: previous Weight 25,0%; Weight proposed 20,0%

- Report of practices: (in those that give by virtual teaching): previous Weight 20,0%; Weight proposed 30,0%

- Work of Seminars: previous Weight 17,5%; Weight proposed 20,0%

- Presentation of the Work of Seminars: previous Weight 7,5%; Weight proposed 10%

* Proofs that modify

- Examination of questions of development: previous Weight 25%. It would change by an Examination of objective questions through the tool of*Moodle. His weighting would be of 20% in the new final

* note test

* additional Information