



## IDENTIFYING DATA

### Geological oceanography II

Subject	Geological oceanography II			
Code	V10G060V01603			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Type	Year	Quadmester
	6	Mandatory	3rd	2nd
Teaching language	Spanish			
Department				
Coordinator	Alejo Flores, Irene			
Lecturers	Alejo Flores, Irene García Gil, María Soledad Nombela Castaño, Miguel Angel Pérez Arlucea, Marta María			
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Web	<a href="http://https://sites.google.com/site/oceangeolvigo/">http://https://sites.google.com/site/oceangeolvigo/</a>			
General description	<p>The subject Geological Oceanography II, intends to train the student in the direct and indirect techniques for the characterization of the submarine bottoms, as well as the geological record in marine environments of continental shelf and deep environments (continental slope, continental abyssal plains, dorsal flanks, Ridges and ocean trenches). Therefore this subject has a different approach to the one of the Geological Oceanography I dedicated to the coastal and coastal areas. It is intended therefore that the student acquire the knowledge in the use and application of the latest generation techniques in sea surveys, as well as the ability to plan and develop oceanographic geological field works and prepare and submit reports. Students are required to take this course in responsible and honest behavior.</p> <p>Any form of fraud (i.e. copy and / or plagiarism) intended to falsify the level of knowledge or skill attained by a student in any type of test, report or work designed for this purpose is considered inadmissible. This fraudulent conduct will be sanctioned with the firmness and rigor that establishes the current regulation.</p>			

## Competencies

Code	
CB1	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
CB2	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
CB3	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
CB4	Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences
CB5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
CE1	To know the vocabulary, codes and concepts inherent to the oceanographic scientific field
CE4	To know the basic techniques to sample the water column, organisms, sediments and sea bottom, as well as the surveying methods for dynamic and structural variables
CE5	Basic knowledge of research methodology in oceanography
CE6	Ability to identify and understand the problems in the field of oceanography
CE8	To understanding the fundamentals of the laws that regulate the use of the marine environment and its resources
CE9	To be familiar with the public and private, national and international organizations and institutions related to the Marine Sciences
CE12	To be able to operate the instrumental techniques applied to sea
CE13	To acquire, evaluate, process and interpret oceanographic data within the theories currently in use
CE14	To recognize and analyze new problems and to propose problem-solving strategies

CE15 To recognize and implement good scientific practice in measurement and experimentation, both in the field and in the laboratory

CE16 To plan, design and implement applied research from the recognition stage to the final evaluation of results and discoveries

CE17 Ability to survey in the field and to work in the laboratory responsibly and safely, encouraging team work

CE18 To transmit writing, verbal and graphical information for audiences of various types

CE20 To find and evaluate marine resources of various kinds

CE26 To plan, direct and write technical reports on marine issues

CT2 Organization and planning skills

CT7 Decision making

CT15 Ability to apply knowledge in practice

### Learning outcomes

Learning outcomes	Competences		
1. Get skills to plan and carry out geological oceanographic surveys	CB1 CB2	CE1 CE4 CE5 CE9 CE13 CE17	CT2 CT15
2. Get familiar with oceanographic databases in public repositories	CB1 CB2 CB5	CE1 CE5 CE9 CE13 CE16 CE20	CT2 CT7
3. To know the basic methods of geophysical exploration	CB3 CB4 CB5	CE1 CE5 CE12 CE13 CE14 CE15 CE16 CE17	CT2 CT15
4. To know the basic techniques of compositional analysis and physical properties of sedimentary cores	CB2 CB3	CE1 CE4 CE5 CE12 CE13 CE15 CE16 CE17	CT2 CT7 CT15
5. To know and apply the techniques of geochemical characterization in sediments.	CB2 CB3 CB4 CB5	CE1 CE4 CE12 CE13 CE16 CE17	CT2 CT7 CT15
6. Get familiar with geophysical and geochemical data processing methods	CB3 CB4 CB5	CE1 CE5 CE6 CE12 CE13 CE15 CE16 CE17	CT2 CT15
7. Get skills to write and submit reports	CB3 CB4	CE1 CE6 CE9 CE13 CE14 CE15 CE16 CE17 CE18 CE26	CT7

### Contents

Topic	
THEMATIC UNITY I-: INTRODUCTION TO THE MARINE GEOLOGICAL RESEARCH IN THE SEA	THEME 1.- Introduction to the subject Geological Oceanography II. Introduction to the geological oceanography technologies applied to the study of shelf and deep sea environments. Presentation of public data repositories.
THEMATIC UNITY -II: POSITION SYSTEMS IN THE SEA	THEME 2.- Topic to select a position system. Global position systems and integration with acoustic position systems.
THEMATIC UNITY III-: ACOUSTIC SYSTEMS IN DEEP SEA	THEME 3.- Acoustic underwater and sonar systems. THEME 4.- Sidescan Sonar
THEMATIC UNIT IV-: MARINE SEISMIC SURVEYING	THEME 5.- Marine Seismic surveying: conceptual aspects. THEME 6.- Description of the diferents equipment and collected records
THEMATIC UNIT V-: MARINE GRAVIMETRY SURVEYING	THEME 7.- Gravimetry surveying and its application to marine research.
THEMATIC UNIT -VI-: MARINE MAGNETIC SURVEYING	THEME 8.- Magnetic surveying and its application to marine research.
THEMATIC UNIT-VII-: MARINE GEOTHERMAL FLOW	THEME 9.- Geothermal flow and its application to marine research.
THEMATIC UNIT -VIII: ELECTROMAGNETIC AND RADIOMETRIC SURVEYING IN MARINE ENVIRONMENTS	THEME 10.- Electromacnetic and radiometric surveying and its application to marine research.
THEMATIC UNIT IX-: SAMPLING SEDIMENTS AND ROCKS METHODS IN SHELF AND DEEP SEA ENVIRONMENTS. GEOTHECNICS TECHNICS	THEME 11.- Sampler methods for Particulate Suspended Matter and bottom sediment samples at deep environments. THEME 12.- Deep sea coring technics. methods. Ocean Drilling Projects. THEME 13.- Geophysical observation into the corers.
THEMATIC UNIT X-: OCEANOGRAPHY INFRAESTRUCTURES	THEME 14.: Sampler platforms in geological oceanography. THEME 15: New technology in submarine observatoties.
THEMATIC UNIT -XI: PLANNING OCEANOGRAPHIC SURVEYS	THEME 16.: Project and planification of oceanographic surveys.

### Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	0	1
Lecturing	24	51.6	75.6
Laboratory practical	15	16.08	31.08
Mentored work	2.16	10.8	12.96
Seminars	4.34	13.02	17.36
Studies excursion	5	5	10
Objective questions exam	2	0	2

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

### Methodologies

	Description
Introductory activities	Detailed introduction about the content of the subject and the methodology followed aswell as the form of evaluation, field trips, practical classes and seminars. The materials necessary to follow lecturesrs ans practical sessions and references will be presented.
Lecturing	This include the theoretical contents about all methods used in Oceanography Geology surveys, including selected aplicated examples. The student will be evaluated about this content in a final exam.
Laboratory practical	Laboratory practices consist of three sessions: 1- Corer description and interpretation. 2- Introduction to the interpretation of seismic records: reflection and refraction systems. 3- Data processing for the elaboration of bathymetric maps (the computer classroom will be used). Attendance is MANDATORY.

Mentored work	In groups of two or three students, the students will choose a applied scientific study on the subject for an oral presentations. The student will show there ability to work as a team and his ability to make an oral presentation on a scientific topic. In the ensuing discussion, the capacity for synthesis and understanding of the proposed topic will be evaluated. The activity is MANDATORY.
Seminars	The seminars that students will have to hold and deliver, consists of three sessions: 1- Handling of nautical charts, navigation parameters, point positioning and sampling path. Key tools for the preparation and conduct of oceanographic surveys. 2- Interpretation of Side Scan Sonar records. 3- Exhibition of examples of studies applied in Geological Oceanography, focusing into the specific methodology used for each specific work. These activities are MANDATORY.
Studies excursion	There will be a session onboard the B/O Mytilus along the Ria de Vigo were the student will participate in a oceanographyc survey. The objetive is to be able to familiarize themselves with the systems of acquisition of submarine acoustic data and of marine sediment samples (sediment cores, dredgers, etc.). It is also intended that they become familiar with the organization and procedure of an oceanographic survey, for which smaller groups of work will be created to carry out the activity on board the oceanographic vessel. At the end of the activity, each group will have to produce a "cruise report". Some of the collected data will be worked out in practical sessions. The activity is MANDATORY.

### Personalized assistance

Methodologies	Description
Introductory activities	This first part corresponds to the presentation of the subject: activities that will be develop along the course, material that will be needed and to specify the deliverables that the students will have to present along the course. The evaluation system to be followed will also be presented. The active participation of the students will be encouraged, basically aimed at clarifying all the doubts related to the approach and development of the subject. The tutoring schedule will be presented: Tuesday from 13:00 h to 14:00 h, Wednesday from 12:00 h. to 14:00 h. and Thursday from 11:00 h to 14:00 h. However, it will be that the student can contact the teacher to clarify doubts at all times, preferably in person, individually or in a group. The hours of tutoring may vary on time when the teacher has other teaching, research or management duties to attend. Also in case the student is unable to adjust to that schedule, it will be possible to arrange tutorial meetings outside the same.
Lecturing	The active participation of the students in the classes will be encouraged, encouraging the discussion and approach of small questions to be solved in class. The student can contact at all times with the teacher to clarify doubts, in person, individually or in a group. If the doubts require a greater personal attention will be agreed a tutorial to solve problems. Tutoring hours: Tuesday from 13:00 h to 14:00 h, Wednesday from 11:00 h h to 14:00 and Thursday from 12:00 h to 14:00 h. This schedule may vary on time when the teacher has other teaching, research or management duties to attend. Likewise in case that the student is impossible to adjust to that schedule, it will be possible to agree meetings of tutorials outside the same one.
Laboratory practical	The practical exercises presented in the three laboratory sessions will be solved in the same classroom, in order to resolve the doubts gradually as they arise as the work progresses in the complexity of the exercises. The active participation of students will be encouraged. Each practice will have a deliverable for evaluation. Once completed, the student can contact at all times with the teacher to clarify doubts, preferably in person, individually or in a group. If the doubts require a greater personal attention will be agreed a tutorial to solve problems. Tutoring hours: Tuesday from 13:00 h to 14:00 h, Wednesday from 11:00 h to 14:00 h and Thursday from 12:00 h to 14:00 h. This schedule may vary on time when the teacher has other teaching, research or management duties to attend. Also in case the student is unable to adjust to that schedule, it will be possible to arrange tutorial meetings outside the same.
Studies excursion	A Oceanography Survey will be acrried out in the B/O Mytilus, in groups of 5-6 students, where they will put in practise the methodology involve into Geological Oceanographyc cruise. Some of the data collected on board will be worked out in practical sessions. After the activity, each group of student have to produce a cruise report, that will be evaluated. This will include: description of the methodology achieve and collected data.

Mentored work	In groups of two or three people, students will choose a current publication that shows an applied practical work of any of the equipment and methodologies that are included in the assignment. They will have to make an exhibition of the same before their colleagues and present a written paper with an article format. 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. Tutoring schedule: Tuesday from 13:00 h to 14:00 h, Wednesday from 11:00 h to 14:00 h and Thursday from 12:00 h to 02:00 h. This schedule may vary on time when the teacher has other teaching, research and/or management duties to attend.
Seminars	The practical exercises presented in the different seminars will be solved in the same classroom, in order to resolve the doubts gradually as they arise as the work progresses in the complexity of the exercises. The active participation of students will be encouraged. Once completed, the student can contact at all times with the teacher to clarify doubts, preferably in person, individually or in a group. If the doubts require a greater personal attention will be agreed a tutorial to solve problems. Tutoring hours: Tuesday from 13:00 h to 14:00 h, Wednesday from 11:00 h to 14:00 h and Thursday from 12:00 h to 14:00 h. This schedule may vary on time when the teacher has other teaching, research or management duties to attend. Also in case the student is unable to adjust to that schedule, it will be possible to arrange tutorial meetings outside the same.

<b>Assessment</b>					
	Description	Qualification	Evaluated Competences		
Laboratory practical	Attendance at the laboratory practices is MANDATORY. The correct implementation of the exercises proposed in these practices will be evaluated.	15	CB1 CB2 CB3 CB4 CB5	CE1 CE4 CE5 CE6 CE12 CE13 CE15 CE17 CE20	CT2 CT7 CT15
Mentored work	The assignment of individual or paired work will be evaluated, assessing both the preparation of the topic, the presentation of a summary document of the subject as well as the presentation of the same. This activity is MANDATORY	15	CB1 CB2 CB3 CB4 CB5	CE1 CE4 CE5 CE6 CE9 CE13 CE14 CE15 CE16 CE17 CE18 CE20 CE26	CT2 CT7 CT15
Seminars	Seminar attendance is MANDATORY. The correct implementation of the exercises proposed in these seminars will be evaluated.	5	CB1 CB2 CB3 CB4 CB5	CE1 CE4 CE5 CE6 CE9 CE14 CE18 CE20 CE26	CT2 CT7 CT15
Studies excursion	Attendance at the sea survey is MANDATORY. The correct implementation of the exercises proposed in these practices will be evaluated.	10	CB5	CE1 CE4 CE5 CE6 CE12 CE13 CE15 CE16 CE17 CE18 CE26	CT2 CT7 CT15

Objective questions exam	Questions and exercises to assess understanding, analytical capacity and synthesis of acquired knowledge.	55	CB1 CB2 CB3 CB4 CB5	CE1 CE4 CE5 CE6 CE8 CE9 CE12 CE13 CE14 CE15 CE16	CT7 CT15
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### Other comments on the Evaluation

In each of these sections it will be necessary to obtain a minimum of 5 points out of 10 to carry out the weighting and pass the subject.

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

Danovaro, R., **Methods for the Study of Deep-Sea Sediments, Their Functioning and Biodiversity**, CRC Press. 458 pp.,

Hailwood, E.A., Kidd, R., **Marine Geological Surveying and Sampling. Marine geophysical Researches.**, Kluwer academic Publishers. 12:169pp,

Hüneke, H., Mulder, T., **Deep-Sea Sediments (Developments in Sedimentology)**., Elsevier Science, 750 pp.,

Jones, E.J.W., **Marine Geophysics**, John Wiley & Sons, LTD. Chichester. 466 pp.,

Kearey, Ph. Brooks, M., Hill, I., **An Introduction to Geophysical exploration Third edition**, Blacwell Scientific Publications, 262 pp.,

Lowrie, W., **Fundamentals of Geophysics. Second Edition.**, Cambridge University Press, 354 pp.,

Mudroch, A. y Azcue, J.M., **Handbook of Techniques for Aquatic Sediments Sampling. Second Edition.**, Lewis Publishers. London. 256 pp.,

Musset, A.E., Aftab, M., **Looking into the earth. An Introduction to Geological Geophysics.**, Cambridge University Press. 470 pp.,

NOAA - National Geophysical Data Center, <http://www.ngdc.noaa.gov/mgg/mggd.html>,

#### Complementary Bibliography

Flor, Germán, **Geología Marina**, Librería Servitec,

Kennet, J., **Marine geology**, Prentice-Hall, inc., 813 pp,

Lillie, R.J., **Whole Earth Geophysicist. An introductory textbook for Geologist & Geophysicists.**, Prentice Hall, Inc. 361 pp.,

Lozano, L., **Introducción a la Geofísica.**, Ed. Paraninfo, Madrid.,

McQuilling, R., Arduis, D.A., **Exploring the Geology of Shelf Seas.**, Graham & Trotman limited. Gulf Publishing Company, 234 pp.,

Mienert, J., Weaver, P., (Eds), **European margin sediment dynamics. Side scan sonar and seismic images.**, Springer.,

Rebesco M, Camerlenghi A (eds), **Contourites**, Developments in Sedimentology, 60, Elsevier, pp 688,

Reynolds, J.M., **An Introduction to Applied and Environmental Geophysics.**, John Wiley, Chichester.,

Seibold, E. y Berger, W.H., **The Sea Floor. An Introduction to Marine geology. 3rd edition.**, Springer Verlag, 369 pp.,

Shanmugam, G., **Deep-Water Processes and Facies Models: Implications for Sandstone Petroleum Reservoirs: 5 (Handbook of Petroleum Exploration and Production)**., Elsevier Science, 496 pp.,

Sheriff, R., **Encyclopedic Dictionary of Exploration Geophysics. Second Edition.**, Society of Exploration Geophysicists, 323 pp,

Sheriff, R.E., **Geophysical Methods**, Prentice Hall. Englewood Cliffs, New York,

Telford, W.M.; Geldart, L.P., Sheriff, R.E., **Applied Geophysics, 2nd Edition.**, Cambridge University Press, 770 pp.,

Trabant, P.K., **Applied High-Resolution Geophysical Methods Offshore Geoengineering Hazards.**, D. reidel Publishing Company. International Human Resources Development Corporation. Boston., 265 p.,

Udias, A., Mézcua, J., **Fundamentos de Geofísica**, Ed. Alhambra. 419 pp,

Wille, P. C., **Sound images of the Ocean in Research and Monitoring.**, Springer-Verlag, 471,

OpenCourseWare, <http://ocw.mit.edu/index.htm>,

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**Recommendations**

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**Subjects that continue the syllabus**

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Applied marine geology/V10G060V01909

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**Subjects that are recommended to be taken simultaneously**

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Basin Analysis/V10G060V01901

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**Subjects that it is recommended to have taken before**

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Geological oceanography I/V10G060V01504

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**Contingency plan**

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**Description**

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=== 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 are all maintained. The master class would adapt to the available resources. The rest would be face-to-face.
- 2.- Non-face-to-face teaching: They are all kept adapting to the available resources (through the remote campus), except for the field trip.

\* Teaching methodologies modified

- 1.- Mixed teaching: don't change
- 2.- Non-face-to-face teaching: They are all kept adapting to the available resources (through the remote campus). A new virtual activity will be added to replace the field trip (supported by audio-visual resources). This activity will collect the content and learning results collected in the guide.

\* Non-attendance mechanism for student attention (tutoring)

- 1.- Mixed teaching: previous agreement by email, face-to-face and/or virtual through Remote Campus.
- 2.- Non-face-to-face teaching: prior agreement by email or virtual through Remote Campus.

\* Modifications (if applicable) of the contents

- 1.- Mixed teaching: don't change.
- 2.- Non-face-to-face teaching: don't change.

\* Additional bibliography to facilitate self-learning

No need.

=== ADAPTATION OF THE TESTS ===

\* Tests already carried out

- 1.- Mixed teaching: se conservan los pesos de la situación presencial.
- 2.- Non-face-to-face teaching: se conservan los pesos de la situación presencial.

\* Pending tests and test modified

- 1.- Mixed teaching: don't change.
- 2.- Non-face-to-face teaching: are modified as follows

Seminars [previous value 5%] => [proposed value 10%]  
Laboratory practices [previous value 15%] => [proposed value 20%]  
Mentored work [previous value 15%] => [proposed value 20%]  
Field trip [previous value 10%] => alternative activity [proposed value 10%]  
Final exam [previous value 55%] => [proposed value 40%]

\* Additional Information

In each section, a minimum rating of 5 points out of 10 will have to be obtained to make the weighting and overcome the subject.

During contactless teaching, students must, in these exceptional circumstances, address this issue with responsible and honest conduct. Any form of copying intended to falsify the level of knowledge and skills achieved in the preparation of deliverables, as well as during the virtual examination, will be considered inadmissible. If there is any suspicion of any kind of fraudulent conduct, students may undergo additional verification to verify its veracity.

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