



IDENTIFYING DATA

Applied marine geology

Subject	Applied marine geology			
Code	V10G061V01403			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	4th	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Gago Duport, Luís Carlos			
Lecturers	Alejo Flores, Irene Diz Ferreiro, Paula Francés Pedraz, Guillermo Gago Duport, Luís Carlos Gil Lozano, Carolina Pérez Arlucea, Marta María			
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Web	http://webc10.webs.uvigo.es/gl/			
General description	This course analyzes the implications of marine geology in evaluating geological risks, environmental impact, coastal conservation, and mineralogical and geochemical aspects associated with the extraction of mineral resources.			
	English Friendly subject: International students may request from the teachers: a) resources and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.			

Training and Learning Results

Code	
A1	Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study
A2	Students can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study
A3	Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues
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.
B5	Develop, implement and write basic or applied projects in oceanography from a multidisciplinary perspective.
C12	Acquire knowledge about processes and products related to internal and external geological cycles.
C13	Acquire the basic sedimentological, geochemical and geophysical techniques and methodologies used in identification, use and sustainability of the natural resources of coastal and marine environments.
C14	Know basic concepts and events of global change obtained from geological records.
D1	Develop the search, analysis and synthesis of information skills oriented to the identification and resolution of problems.

Expected results from this subject

Expected results from this subject	Training and Learning Results
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1. Know the main applications of the Marine Geology regarding natural resources, risks, environmental problems and associated to the Global Change.	A1 A2 A3 A5	B1	C13 C14	D1
2. Know the main coastal and submarine geological risks and his consequences. Purchase the capacities for the design of measures of adaptation in prevention of risks.	A1 A2 A3 A5	B5	C13	D1
3. Know and modeling the antrophic impacts on coastal and marine environments and the methodology of regeneration, restoration and protection.	A1 A2 A3 A5	B5	C12 C14	D1
4. Know the main geological resources of the half marine and his training, as well as the basic strategies of exploration and exploitation. Other applications: methods on CO2 capture.	A1 A2 A3	B1 B5	C12 C13	D1
5. Realisation of technical reports	A3	B1 B4 B5	C14	D1

Contents

Topic	
1. Geological risks associated with the marine and coastal environment. (6 hours).	Introduction 1.1. Definition and types of geological risks. 1.2. Coastal and submarine risks linked to internal geodynamics. 1.3. Coastal and submarine risks linked to external geodynamics. 1.4. Sea level changes.
2. Seawater as a source of resources and environmental control. (4 hours).	2.1. Physicochemical and compositional characteristics of seawater. 2.2. Urey's equation: the terrestrial thermostat and the stability of the ocean's pH. 2.3 Processes for obtaining salts: sequential evaporation of seawater. Desalination and brine recovery plants. 2.4. Practical example: Recovery of lithium from seawater: reality or utopia?
3. Genesis, exploration and exploitation of marine geological resources (8 hours).	3.1 Fossil hydrocarbons: oil, gas and gas hydrates. 3.2 Submarine mining: manganese nodules and crusts. Metallic polysulfides. 3.3 Exploration of the ocean floor: geohabitats. 3.4 Exploration of the oceanic subsoil in IODP expeditions.
Seminars.	Seminar I. Stratigraphic control in oil exploration wells (6 hours). Seminar II. Geological capture of atmospheric CO2. (2 hours). Seminar III. Techniques for mineralogical and geochemical analysis of marine sediments. (2 hours). Seminar IV. Practical case: aquifer salinization models on the coast of Almería (4 hours).
Field trips.	Two field trips to analyse flood risk and anthropic effects along different Galician coastal areas (16 hours).
Laboratory practices.	Laboratory practices: Crystallization processes applied to the formation of marine mineral resources. (4 hours.).

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	18	45	63
Seminars	14	37	51
Laboratory practical	4	4	8
Studies excursion	16	0	16
Objective questions exam	2	0	2
Problem and/or exercise solving	0	2	2
Report of practices, practicum and external practices	0	4	4
Report of practices, practicum and external practices	0	4	4

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

Methodologies

Description

Lecturing	Presentation of the theoretical contents about the subject under study, theoretical bases and/or guidelines of a work, an exercise that the student body has to develop.
Seminars	Activity focused on work on specific topics, complementary to the theoretical classes, which may involve solving exercises on practical cases.
Laboratory practical	Realization of experiments on crystallization the laboratory. They are used as a laboratory analogues to understand the precipitation of minerals in the marine environment. They are clinical/experimental practices of compulsory attendance.
Studies excursion	Coastal flood risks and data collection. Human action on coasts. Analysis of the geological context. These are activities considered clinical/experimental and, therefore, attendance is mandatory.

Personalized assistance

Methodologies	Description
Seminars	Personalized attention will be provided through tutoring carried out in person or through the use of the virtual campus. Tutoring will be arranged at the request of the student, and will be focused on resolving doubts about the contents of the seminars.
Laboratory practical	Conducting crystallization experiments applied to the formation of marine minerals. The student can go to personalized tutoring. These will be arranged at the request of the student and will be focused on resolving doubts about the work done in the laboratory
Studies excursion	The student who wishes may go to tutorials. These will be arranged at the student's request and focused on resolving doubts about the fieldwork.
Tests	Description
Objective questions exam	Attention of doubts
Problem and/or exercise solving	Attention of doubts
Report of practices, practicum and external practices	Attention of doubts
Report of practices, practicum and external practices	Attention of doubts

Assessment

	Description	Qualification	Training and Learning Results			
Seminars	The activity of the seminars is focused on the development of specific topics, complementary to the theoretical classes, which may involve solving exercises on practical cases. Attendance at the seminars is mandatory in order to access the continuous assessment.	0	A2 A3 A5		D1	
Laboratory practical	Crystallization processes and their application to the formation of marine mineral resources are analyzed using experimental techniques. Attendance is mandatory and active participation is evaluated.	5	A3	C13	D1	
Studies excursion	Some of the most relevant aspects described in the theoretical program are analyzed through the geological trips through different points of the Galician coast. It is a clinical/experimental activity and, therefore, mandatory attendance is required.	0	A3	C13 C14	D1	
Objective questions exam	Part of the theoretical proof-practical.	35	A1 A3 A5	B1 C12 C14		
Problem and/or exercise solving	Reports of the seminars	35	A2 A3 A5	B1 B4 C12	D1	
Report of practices, practicum and external practices	Report of the practices	5	A2 A3 A5	B1 B4 C12 C13 C14	D1	
Report of practices, practicum and external practices	Reports of the fieldwork	20	A2 A3 A5	B1 B4 B5	C12	D1

Other comments on the Evaluation

- Attendance at practices, seminars and field trips is mandatory.

- In case of non-attendance at any of the seminars, the corresponding report cannot be submitted.
 - A number of absences of more than 20% in seminars will interrupt the **continuous evaluation process**.
 - Students who have not attended in their entirety - except for justified reasons - laboratory practices or field trips, given their clinical/experimental nature, will not be able to opt for the evaluation of these activities. (art. 14 Reg. aval. 2023).
- In the global evaluation**, the final exam -in any of the calls- may include any theoretical and/or practical aspects that have been explained during the course, both in theoretical classes and in seminars. Practices of a clinical/experimental nature (laboratory practices and field trips) may not be the subject of global evaluation. (art. 14 Reg. aval. 2023).

Evaluation at the first opportunity

To pass the subject by continuous assessment, it will be necessary to reach 40% of the maximum score in seminars, practices and field trips, as a necessary condition to take the objective question exam, which will contribute 35% of the remaining grade.

Second chance evaluation

The exam will have the same characteristics and fulfill the same requirements as **the global assessment of the first opportunity**

Exam dates and classes can be consulted on the website of the Faculty of Marine Sciences.

Individualized tutoring.

Tutoring schedules of subject teachers can be consulted on the MOOVI platform.

"Responsible and honest behavior is required of the students taking this subject. If any form of fraud (copying or plagiarism) aimed at falsifying the level of knowledge and skills achieved in any type of test is considered inadmissible, report the work. Fraudulent behavior may result in suspension of the subject for an entire course. An internal record of these actions will be kept so that, in case of recidivism, the rector can request the opening of a disciplinary file"

Sources of information

Basic Bibliography

- Beatley, T., **An Introduction to coastal zone management**, 2ª ed, Island Press, 2002
- Burns, R. (Ed.), **Marine Minerals. Reviews in Mineralogy, vol 6**, Mineralogical Society of America, 1979
- Craig, J.R., Vaughan, D.J. & Skinner, B.J., **Recursos de la Tierra y el Medio Ambiente**, 4ª ed., Pearson Education, 2012
- Hsu, Chang Samuel., and Paul R. Robinson, **Handbook of Petroleum Technology**, 2ª ed., Springer International, 2017
- Chester, Roy., **Marine Geochemistry**, 2ª ed., Oxford: Blackwell Science, 2000
- Earney, P.C.E., **Marine Mineral Resources**, Taylor and Francis, 2012

Complementary Bibliography

- Couper, A, **The Times Atlas and Encyclopaedia of The Sea**, Times Book Ltd, 1989
- Cronan, D.S., **Handbook of Marine Mineral Deposits**, CRC Press,, 1999
- Seibold, E.; Berger, W.H., **The sea floor. An introduction to marine geology**, 2ª ed., Springer, 2017
- Keller, E.A., Blodgett, R.H, **Riesgos Naturales: Procesos de la Tierra como riesgos, desastres y catástrofes**, Pearson Educación, 2007

Recommendations

Subjects that continue the syllabus

- Basin Analysis/V10G061V01406
- Geographic analysis methods/V10G061V01409

Subjects that are recommended to be taken simultaneously

- Marine and coastal management/V10G061V01404

Subjects that it is recommended to have taken before

- Coastal and marine sedimentary habitats/V10G061V01207
- Geological oceanography I/V10G061V01303
- Geological oceanography II/V10G061V01308
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