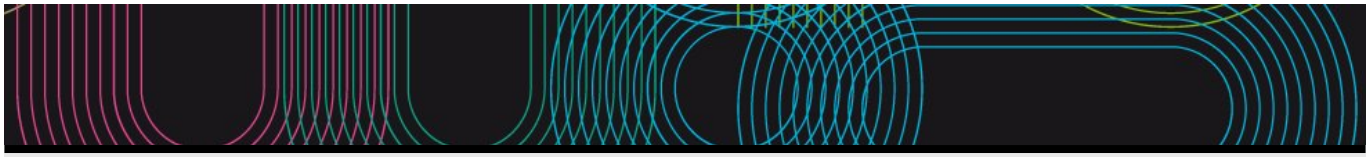

IDENTIFYING DATA				
Geological oceanography I				
Subject	Geological oceanography I			
Code	V10G061V01303			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	1st
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Bernabéu Tello, Ana María			
Lecturers	Alejo Flores, Irene Bernabéu Tello, Ana María Fontán Bouzas, Ángela			
E-mail	bernabeu@uvigo.es			
Web	http://https://mar.uvigo.es/			
General description	Geological oceanography (also called marine geology) is one of the broadest fields in the Earth Sciences and contains many subdisciplines, including geophysics, and plate tectonics, petrology and geochemistry, sedimentation processes, and micropaleontology and stratigraphy. Geological Oceanography I will focus on the study of basic earth proceses affecting sedimentation in litoral areas, since sediments are the main geological feature of these region. The subject will cover the fundamental techniques to study the topography, structure, sedimentation, and associated geological processes of these areas to discover how they were formed and how ongoing processes (coastal dynamics, climate change, human impact...) may change them in the future. The subject will deal with the peculiarity of combining terrestrial and marine data to study litoral and coastal processes. 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.
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.
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 environmets.
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.
D2	Acquire the ability to learn autonomously, continuously and collaboratively, organizing and planning tasks over time.
D5	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.

Expected results from this subject	Training and Learning Results			
Ability to plan and execute field campaigns on the coast and coastline.	A5	B2	C13	D1 D5
Manage the techniques of observation, measurement, recognition and description of marine sedimentary elements and materials in these environments.	A1 A5	B1	C12 C13	D1
Manage sampling and prospecting techniques.	A2 A5	B2	C12 C14	D1
Handle sediment characterization and analysis techniques.	A1 A2 A5	B1 B2	C12 C13	D1 D2
Geological mapping and representation capabilities	A2 A3	B1	C12 C13	D2
Ability to prepare and present reports	A3 A5	B1 B5	C14	D1

Contents	
Topic	
T0 Presentation	0.1 Aims 0.2 Activities 0.3 Program 0.4 System of qualification
T1 Introduction	1.1 History and development of the Geological Oceanography 1.2 Importance of the Geological Oceanography
T2 General protocol for the geological investigation in coastal area	2.1. Nature of the research and of the projects in marine geology 2.2. General protocol for design and execution of a project 2.3. Approach and definition of methodological strategies 2.4. Evaluation, interpretation and publication of data
T3 Coastal morphodynamics	3.1 Basic concepts 3.2 Influence of the swell, the tide and the sedimentary characteristics 3.3 Morphodynamics evolution of the systems of beach
T4 Introduction to the positioning systems	4.1 Importance of the positioning in the acquisition of data 4.2 Basic concepts in geodesy: geoid, ellipsoid and datum 4.3 Global system of navigation by satellite (GNSS) 4.4 Sources of error in the measures of positioning 4.5 GPS: Methods of measure
T5 Methods of sampling and subsampling	5.1 Determination of sampling objectives, strategy and equipment selection 5.2 Sampling in subtidal area: techniques and strategy 5.3 Sampling in sea: Sediment of the bottom Sediment in the water column 5.4 Protocol for processing of samples in laboratory 5.5 Cataloging, archive and conservation
T6 Advanced methods of characterisation of the sediment SEMINAR 1: Physical properties of the sediment	- Density gamma and gamma natural - Resistivity and poropermebility - Susceptibility and other magnetic properties - Photos and colour - X-rays - Corescanners: *GEOTEK and 2G
T6 Advanced methods of characterisation of the sediment SEMINAR 2: Compositional analysis	- Elementary analysis: LECO, ICP, FRX - Mineralogical analysis: DRX - Corescanners: ITRAX and AVAATEC
T6 Advanced methods of characterisation of the sediment SEMINAR 3: Electronic microcopy	- Textural study - Compositional analysis
T7 Study of the intertidal and supra tidal zone	7.1 Duality earth-sea 7.2 Topography, teams of measured GPS Lidar 7.3 Study of the subsoil: GPR
T8 Study of the subtidal zone: Acoustic methods	8.1 Foundations of acoustic waves 8.2 Echo sounders 8.3 Side scan sonar 8.4 Processed of data

T9 Subsuperficial study of the subtidal zone: seismic Methods	9.1 Foundations of seismic waves 9.2 Seismic of reflection: Equipments Acquisition of data Processed of a seismic line Interpretation of data
PA1 Planning Campaign	Like designing a project, will make on a real example PA1.1 Definition of aims PA1.2 Selection of methodologies PA1.3 Definition of activities and scope PA1.4 Cronograms PA1.5 Economic calculations
PA2 Field trip	PA2.1 Requirements and basic norms of security in oceanographic boats PA2.2 Conhabitation PA2.3 Manoeuvres and technical of sediment sampling PA2.4 Manoeuvres and technical of geophysical exploration. PA2.5 Management and archive of data

Planning

	Class hours	Hours outside the classroom	Total hours
Seminars	7	9	16
Field practice	5	5	10
Introductory activities	2	4	6
Case studies	15	32	47
Lecturing	23	33	56
Autonomous problem solving	0	15	15

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

Methodologies

	Description
Seminars	2:20 h long seminars on complementary topics
Field practice	It includes ship minicruises oriented to experience oceanographic work in real conditions
Introductory activities	It comprises the activities carried out during the two first lectures, like subject presentation, time schedule, qualification procedures and other pertinent indications for the course well-being.
Case studies	Preparation of a project in real terms: analysis of the problematic, definition of aims, methodological planning, timing and economic estimate.
Lecturing	Lectures comprising the major topics of the course program
Autonomous problem solving	Throughout the theoretical development of the subject, questions and problems related to the contents covered will be raised that the student must solve autonomously.

Personalized assistance

Methodologies	Description
Lecturing	The tutorials will take place preferably on Monday and Thursday from 12:00 to 14:00 The tutoring sessions may be carried out by telematic means (email, videoconference, FAITIC forums, ...) under the modality of prior agreement. In the face-to-face modality, the tutorials will be held in office D42, block C, 3rd floor of the CC Experimental Building, as long as the teacher does not have to attend to other academic obligations. To optimize the time, it is necessary for the student to contact the teacher in advance
Seminars	The tutorials will take place preferably on Monday and Thursday from 12:00 to 14:00 The tutoring sessions may be carried out by telematic means (email, videoconference, FAITIC forums, ...) under the modality of prior agreement. In the face-to-face modality, the tutorials will be held in office D42, block C, 3rd floor of the CC Experimental Building, as long as the teacher does not have to attend to other academic obligations. To optimize the time, it is necessary for the student to contact the teacher in advance
Field practice	The tutorials will take place preferably on Monday and Thursday from 12:00 to 14:00 The tutoring sessions may be carried out by telematic means (email, videoconference, FAITIC forums, ...) under the modality of prior agreement. In the face-to-face modality, the tutorials will be held in office D42, block C, 3rd floor of the CC Experimental Building, as long as the teacher does not have to attend to other academic obligations. To optimize the time, it is necessary for the student to contact the teacher in advance

Introductory activities	The tutorials will take place preferably on Monday and Thursday from 12:00 to 14:00 The tutoring sessions may be carried out by telematic means (email, videoconference, FAITIC forums, ...) under the modality of prior agreement. In the face-to-face modality, the tutorials will be held in office D42, block C, 3rd floor of the CC Experimental Building, as long as the teacher does not have to attend to other academic obligations. To optimize the time, it is necessary for the student to contact the teacher in advance
Case studies	The tutorials will take place preferably on Monday and Thursday from 12:00 to 14:00 The tutoring sessions may be carried out by telematic means (email, videoconference, FAITIC forums, ...) under the modality of prior agreement. In the face-to-face modality, the tutorials will be held in office D42, block C, 3rd floor of the CC Experimental Building, as long as the teacher does not have to attend to other academic obligations. To optimize the time, it is necessary for the student to contact the teacher in advance

Assessment

	Description	Qualification	Training and Learning Results			
Seminars	Individual written report on the activity made in seminars. It can include questionnaires. This activity is of compulsory assistance given his experimental character	10	A1 A2 A3 A5	B1 B5	C12	D1 D2
Field practice	Comprises a brief individual or group written summary, depending on the nature of the field trip. It must reflect the activity carried out in the field and its scope. This activity is of compulsory assistance given his experimental character	10	A2 A5	B1		D1 D5
Case studies	Group report that reflects the activities carried out during the practices, which will include objectives, methodology, results and conclusions. This activity is of compulsory assistance given his experimental character	25	A2 A3 A5	B1 B5	C13 C14	D1 D2
Lecturing	Written individual test of 2 to 4 hours, whose aim will be the global evaluation of the process of learning and the acquisition of skills and knowledge. It will comprise one or several of the following types of assessments: long questions to elaborate, short questions, tests, problem resolution, interpretation of images, maps and diagrams.	40	A1 A2 A3 A5	B1	C12 C13 C14	D1 D2
Autonomous problem solving	Resolve questions and problems related with theoretical contents that the students have to tackle of autonomous form.	15	A1 A2 A3	B1	C12 C13 C14	D1 D2

Other comments on the Evaluation

Attendance field trip, seminars and practices is an essential condition to be qualified. These activities are compulsory attendance given their experimental nature.

If one of the parts is not qualified, the grade that will be assigned will be the pure average divided by 2.

You must reach reach at least 50% of the maximum partial score in each of blocks to be able to compensate by taking the average with the qualification obtained in the others blocks.

If the subject is not passed, the grade obtained in any of the blocks is not retained for the following course.

2º chance

It will consist of an exam that will evaluate the theoreticcal and practical contents of the subject, provided that the students have attended seminar classes, practices and field trips

Global evaluation option

TThe application for this evaluation option must be submitted in the time and manner determined by the Center, which will be published prior to the academic start. Given the experimental nature of the practices, attendance at them is mandatory to be eligible for this evaluation option. **Failure to attend the practices, with no justified cause invalidates this possibility, as well as the opportunity for extraordinary evaluation (2nd opportunity).**

Other considerations:

The official exam dates can be found at: http://mar.uvigo.es/alumnado/*examenes/

Students who takes this subject are required to behave responsibly and honestly. It considers inadmissible any form of fraud (copy or plagiarism) directed to distort level of knowledges and skills reached in all type of proof, report or work.

Fraudulent conduct may suppose suspend the subject during a full course. An internal record of these actions will be kept so that, in case of recidivism, request the opening of a disciplinary file to the rector.

Sources of information

Basic Bibliography

E.A. Hailwood, R. Kidd, **Marine Geological Surveying and Sampling**, 978-94-010-6763-8 (Print) 978-94-009-0615-0 (Online), Springer, 1990

E. J. W. Jones, **Marine Geophysics**, 978-0-471-98694-2, Wiley, 1999

H.D. Schulz, Matthias Zabel, **Marine Geochemistry**, 978-3-540-32143-9 (Print) 978-3-540-32144-6 (Online), Springer, 2006

M. E. Tucker, **Techniques in Sedimentology**, 978-0632013722, Wiley-Blackwell, 1991

Bernabeu, A.M., Abilleira, P., Fernández-Fernández, S., Lersundi-Campistegui, A. V., **Capítulo XXIX. Métodos para la evaluación del transporte de sedimentos en el litoral. En: Métodos Y Tecnicas En Investigacion Marina**, 9788430952083, TECNOS, 2011

K Mohamed, D. Rey, **Capítulo XXX. Técnicas de magnetismo ambiental de utilidad en el estudio de sedimentos marinos. En: En: Métodos Y Tecnicas En Investigacion Marina**, 9788430952083, TECNOS, 2011

B. Rubio, D. Rey, A.M. Bernabeu, F. Vilas, I. Rodríguez Germade, A. Ares, **Capítulo XXXI. Nuevas técnicas de obtención de datos geoquímicos de alta resolución. En: Métodos Y Tecnicas En Investigacion Marina**, 9788430952083, TECNOS, 2011

I.W. Croudace; R.G. Rothwell, **Micro-XRF Studies of Sediment Cores: Applications of a non-destructive tool for the environmental sciences**, Springer, 2015

CC W Finkl; C. Makowski, **Seafloor Mapping along Continental Shelves: Research and Techniques for Visualizing Benthic Environments**, Springer, 2016

Complementary Bibliography

http://walrus.wr.usgs.gov/pubinfo/margeol2.html,

Comission of marine cartography, **http://www.shoa.cl/ica/index.html**,

GEODAS Geophysical Data Management System of the NOAA National Geophysical Data Center (NGDC), **http://www.ngdc.noaa.gov/mgg/geodas/geodas.html**,

Recommendations

Subjects that continue the syllabus

Geological oceanography II/V10G061V01308

Subjects that are recommended to be taken simultaneously

Biological oceanography I/V10G061V01301

Subjects that it is recommended to have taken before

Geology: Geology 1/V10G061V01103
Geology: Geology 2/V10G061V01108
Coastal and marine sedimentary habitats/V10G061V01207
Sedimentology/V10G061V01205

Other comments

DELIVERY OF ASSIGNMENTS
Unless it is stated otherwise, all the hand outs have to be delivered in electronic format and uploaded to the MooVI platform. No email, or paper submission will be accepted or acknowledged.
IMPORTANT
All deadlines expire at 24:00 of the marked day.
REGARDING THE AUTHORSHIP OF THE GROUP ASSIGNMENTS
Submission of the assignment is the responsibility of the coordinator, who must state the participants. All coauthors must upload their copy at MooVI to claim co-authorship.
Authorship cannot be modified after the deadline of the assignment.
Authors that appear in more than one assignment will cause the assignment to fail for all authors.
Plagiarism, partly or in whole, will cause course to fail and will be reported to the Dean for disciplinary action.
THE MooVI PLATFORM IS THE OFFICIAL COMMUNICATION CHANNEL OF THE COURSE
Any agreement has to be stated in the MooVI platform to be official.