



## Information about the subject

**Degree:** Bachelor of Degree in Marine Sciences

**Faculty:** Faculty of Veterinary Medicine and Experimental Sciences

**Code:** 272005 **Name:** Geophysics and Tectonics

**Credits:** 6,00 **ECTS Year:** 2 **Semester:** 1

**Module:** Transversal Knowledge and Techniques in Marine Sciences

**Subject Matter:** Marine Geology **Type:** Compulsory

**Department:** Oceanography and Environment

**Type of learning:** Classroom-based learning

**Languages in which it is taught:** Spanish

### Lecturer/-s:

272A

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## Module organization

### Transversal Knowledge and Techniques in Marine Sciences

Subject Matter	ECTS	Subject	ECTS	Year/semester
Organisms and Systems	30,00	Marine Botany	6,00	2/2
		Marine Ecology	6,00	3/2
		Marine Microbiology	6,00	2/2
		Marine Zoology	6,00	2/1
		Physiology of Marine Organisms	6,00	2/2
Marine Geology	12,00	Geophysics and Tectonics	6,00	2/1
		Sedimentology	6,00	2/2
Geographic Information Systems and Remote Sensing	6,00	Geographic Information Systems and Remote Sensing	6,00	2/1
Statistics	6,00	Applied Statistics	6,00	2/1

## Recommended knowledge

Knowledge of geology and physics.  
Spatial and temporal skills



## Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

- R1 The student samples sediments on the coast and performs textural and compositional analysis of them.
- R2 The student performs the morphodynamic study of a current duna-beach system by monitoring its topographical changes and the characteristics of the sediment.
- R3 The student knows the basic concepts for the identification and classification of sedimentary basins and environments.
- R4 The student knows the main characteristics of acoustic waves and their applications in single beam and multi beam systems.
- R5 The student designs and executes a bathymetric campaign, including measurements on the boat and the digital processing of the data until a bathymetric map is obtained.
- R6 The students interprets sonograms and spatial characterization of shapes and submerged objects.
- R7 The student knows the concepts, laws and principles in seismic prospecting.
- R8 The student designs and interprets graphs of radar records obtained by the results of seismic refraction studies.
- R9 The student understands the fundamentals and applications of gravity in marine exploration.



## Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

BASIC		Weighting			
		1	2	3	4
CB2	Students are able to apply knowledge to their work in a professional way and have the competences enabling them to state and defend views and opinions as well as perform problem-solving tasks in their field of study.				X
CB5	Students develop the necessary learning skills to undertake further studies with a high level of autonomy.			X	

GENERAL		Weighting			
		1	2	3	4
CG1	Capacity to analyze and synthesize				X
CG2	Capacity to organize and plan		X		
CG3	Mastering Spanish oral and written communication	X			
CG6	Capacity to manage information (capacity to look for and analyze information coming from different types of sources)				X
CG7	Decision making	X			
CG8	Capacity to work in interdisciplinary and multidisciplinary team			X	
CG10	Critical and self-critical capacity		X		
CG11	Capacity to learn				X
CG12	Capacity to adapt to new situations			X	
CG13	Capacity to produce new ideas (creativity)		X		



CG16 Capacity to apply theoretical knowledge

x

CG18 Sensibility to environmental issues.

x

SPECIFIC	Weighting			
	1	2	3	4
CE6 Applying marine instrument techniques			x	
CE7 Collecting, assessing, processing and interpreting oceanographic data, following the most recent theories				x
CE8 Identifying and analyzing new problems and proposing solution strategies		x		
CE9 Knowing how to carry out experiments and measurements both in the laboratory and during sample collection		x		
CE10 Knowing how to use planning, designing and implementing research tools while surveying and assessing results			x	
CE11 Knowing how to do fieldwork and laboratory experiments in a safe and responsible way, promoting teamwork			x	
CE12 Describing, classifying and mapping sea bottoms and coastal areas				x
CE13 Looking for and assessing different kinds of marine resources			x	



## Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3, R4, R5, R6, R7, R8, R9	50,00%	Written test with theoretical and practical questions
R3, R5, R6, R8	30,00%	Delivery of guided assignments, whose objectives and contents will be proposed by the teacher
R3, R5, R6, R8	10,00%	Laboratory test
R3, R4, R5, R7, R8	10,00%	Oral presentation

### Observations

#### MENTION OF DISTINCTION:

According to Article 22 of the Regulations governing the Evaluation and Qualification of UCV Courses, the mention of "Distinction of Honor" may be awarded by the professor responsible for the course to students who have obtained, at least, the qualification of 9 over 10 ("Sobresaliente"). The number of "Distinction of Honor" mentions that may be awarded may not exceed five percent of the number of students included in the same official record, unless this number is lower than 20, in which case only one "Distinction of Honor" may be awarded.

## Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

- M1 Teacher presentation of contents, analysis of competences, explanation and in-class display of skills, abilities and knowledge.
- M2 Group work sessions supervised by the professor. Case studies, diagnostic tests, problems, field work, computer room, visits, data search, libraries, on-line, Internet, etc. Meaningful construction of knowledge through interaction and student activity.



- M3 Activities carried out in spaces with specialized equipment.
- M4 Supervised monographic sessions with shared participation.
- M5 Application of multidisciplinary knowledge.
- M6 Personalized and small group attention. Period of instruction and/or guidance carried out by a tutor to review and discuss materials and topics presented in classes, seminars, readings, papers, etc.
- M8 Set of oral and/or written tests used in initial, formative or additive assessment of the student.
- M9 Group preparation of readings, essays, problem-solving, seminars, papers, reports, etc. to be presented or submitted in theoretical , practical and/or small-group tutoring sessions. Work done on the university e-learning platform ([www.plataforma.ucv.es](http://www.plataforma.ucv.es) )
- M10 Student's study: Individual preparation of readings, essays, problem-solving, seminars, papers, reports, etc. to be presented or submitted in theoretical, practical and/or small-group tutoring sessions. Work done on the university e-learning platform ( [www.plataforma.ucv.es](http://www.plataforma.ucv.es) ).



## IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
ON-CAMPUS CLASS M1	R1, R2, R3, R4, R6, R7, R9	30,00	1,20
PRACTICAL CLASSES M2	R3, R5, R6, R8	17,00	0,68
LABORATORY M3	R5	2,00	0,08
SEMINAR M4	R9	3,00	0,12
GROUP PRESENTATION OF ASSIGNMENTS M5	R5	3,00	0,12
TUTORIAL M6	R3, R5, R6, R8	3,00	0,12
ASSESSMENT M8	R3, R4, R5, R6, R7, R8, R9	2,00	0,08
<b>TOTAL</b>		<b>60,00</b>	<b>2,40</b>

## LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
GROUP WORK M9	R5	18,00	0,72
INDEPENDENT WORK M10	R3, R4, R6, R7, R8, R9	72,00	2,88
<b>TOTAL</b>		<b>90,00</b>	<b>3,60</b>





## Description of the contents

Description of the necessary contents to acquire the learning outcomes.

### Theoretical contents:

Content block	Contents
UNIT 1 INTRODUCTION TO GEOPHYSICS	Areas of study and methodologies used in Geophysics
UNIT 2- PLATE TECTONICS	Continental drift. Geomagnetism. Plate boundaries and continental margins. Wilson's cycle. Tectonic domains. Hot spots and aseismic ridges.
UNIT 3-ACOUSTICS	Sound Waves. Single beam and multibeam systems. Classification of seafloor. Sidescan sonar. Resolution. Processing records.
UNIT 4-SEISMICS	Seismic Waves. Dromocrone. Monochannel multichannel seismic. Sources and receivers of seismic waves.
UNIT 5- GRAVIMETRY	Gravimetric prospection. Methods of measurement and correction of anomalies.



## Organization of the practical activities:

	Content	Place	Hours
PR1.	Study of regional tectonics. Specific report of existing lithospheric plates and plate edge types.	Lecture room	6,00
PR2.	Carrying out a bathymetric study: Elaboration of a bathymetric campaign, planning of the route, collection and processing of data, presentation of the results in a report.	Boat	6,00
PR3.	Calculating distances and dimensions from a sonogram.	Laboratory	6,00
PR4.	Speed of sound. Calculations of the speed of sound in water using specific software following different methods.	Computer	2,00

## Temporary organization of learning:

Block of content	Number of sessions	Hours
UNIT 1 INTRODUCTION TO GEOPHYSICS	1,00	2,00
UNIT 2- PLATE TECTONICS	4,00	8,00
UNIT 3-ACOUSTICS	12,00	24,00
UNIT 4-SEISMICS	10,00	20,00
UNIT 5- GRAVIMETRY	3,00	6,00



## References

- DEL ROSARIO RABADÁN, V. Y ROSSIS ALFONSO, R. (2018). La geología en 100 preguntas. Madrid: Nowtilus Saber.
- EBUFORN PEIRO, E. (2010). Problemas resueltos de Geofísica Madrid: Prentice Hall.
- FLOR RODRÍGUEZ, G.S. (2004). Geología marina. Oviedo, El autor.
- FOWLER, C. M. R. (1990). The Solid Earth. An Introduction to Global Geophysics, Cambridge University Press.
- JONES, E. J. W. (1999). Marine Geophysics. Chichester: John Wiley & Sons.
- KEAREY, P. Y BROOKS, M. (1991). An Introduction to Geophysical Exploration 2<sup>a</sup> edition. Blackwell Scientific Publications.
- LILLIE, R. J. (1999). Whole Earth Geophysics. An Introductory Textbook for Geologist and Geophysicists. Prentice Hall.
- LOWRIE, W. (1997). Fundamentals of Geophysics. Cambridge: Cambridge University Press.
- NITTROUER, C.A., AUSTIN, J.A., FIELD, M.E., KRAVITZ, J.H., SYVITSKI, J.P.M, and WIBERG, P.L., eds., (2007) Continental margin sedimentation from sediment transport to sequence stratigraphy: Blackwell Publishing, International Association of Sedimentologists Special Publication 37
- OPEN UNIVERSITY COURSE TEAM. (1998). The Ocean Basins: Their Structure and Evolution. Elsevier / Butterworth-Heinemann.
- REYNOLDS, J. M. (2011). An Introduction to Applied and Environmental Geophysics, Wiley-Blackwell.
- SEIBOLD, E.; BERGER, W. (2017). The sea floor, Springer
- TARBUCK, E. J. Y LUTGENS, F. K. (2000). Ciencias de la Tierra. Una introducción a la Geología Física. Madrid: Prentice Hall.
- UDIAS, A Y MEZCUA, J. (1997). Fundamentos de Geofísica. Madrid: Alianza Editorial.



## Addendum to the Course Guide of the Subject

Due to the exceptional situation caused by the health crisis of the COVID-19 and taking into account the security measures related to the development of the educational activity in the Higher Education Institution teaching area, the following changes have been made in the guide of the subject to ensure that Students achieve their learning outcomes of the Subject.

**Situation 1: Teaching without limited capacity** (when the number of enrolled students is lower than the allowed capacity in classroom, according to the security measures taken).

In this case, no changes are made in the guide of the subject.

**Situation 2: Teaching with limited capacity** (when the number of enrolled students is higher than the allowed capacity in classroom, according to the security measures taken).

In this case, the following changes are made:

### 1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject will be made through a simultaneous teaching method combining onsite teaching in the classroom and synchronous online teaching. Students will be able to attend classes onsite or to attend them online through the telematic tools provided by the university (videoconferences). In any case, students who attend classes onsite and who attend them by videoconference will rotate periodically.

In the particular case of this subject, these videoconferences will be made through:

☒ Microsoft Teams

☐ Kaltura



## **Situation 3: Confinement due to a new State of Alarm.**

In this case, the following changes are made:

### **1. Educational Activities of Onsite Work:**

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject, as well as the group and personalized tutoring, will be done with the telematic tools provided by the University, through:

☒ Microsoft Teams

☐ Kaltura

Explanation about the practical sessions:

The boat practice can be replaced by view videos of oceanographic surveys specialized in bathymetry.



## 2. System for Assessing the Acquisition of the competences and Assessment System

### ONSITE WORK

#### Regarding the Assessment Tools:

☒ The Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus.

☐ The following changes will be made to adapt the subject's assessment to the online teaching.

Course guide		Adaptation	
Assessment tool	Allocated percentage	Description of the suggested changes	Platform to be used

The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.

#### Comments to the Assessment System: