Course guide
250553 - FONAMGEOL - Fundamentals of Geology

Last modified: 22/05/2025

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.

Degree: BACHELOR'S DEGREE IN MARINE SCIENCE AND TECHNOLOGY (Syllabus 2018). (Compulsory subject).

Academic year: 2025 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: ALBERT FOLCH SANCHO

Others: ALBERT FOLCH SANCHO

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
13388. To know and apply the lexicon and concepts of the Marine Sciences and Technologies and other related fields.
13390. Establish a good practice in the integration of common numerical, laboratory and field techniques in the analysis of any problem related to the marine environment.
13401. Apply spatial and cartographic representation techniques for different environments and scales.

Generical:
13380. Develop a professional activity in the field of Marine Sciences and Technologies.
13381. Address in a comprehensive manner the analysis and preservation of the marine environment with sustainability criteria.

TEACHING METHODOLOGY

The course consists of 6 hours per week of theory and practice.

In the theory classes, the basic concepts of the matter will be exposed by the teacher

In the practice classes, the teacher will propose problems and exercises which will be solved by the students with the purpose to consolidate the learning objectives

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be held in other languages.

LEARNING OBJECTIVES OF THE SUBJECT

In this course, the fundamental aspects of Geology will be addressed, emphasizing on the genesis of the solid Earth (plate tectonics, range uplift, igneous activity, minerals, rock types and its origin, etc.) and the external processes that shape it (weathering, erosion, transport and sedimentation).

1.- Understand the Earth structure, the processes acting in the inner earth and on the surface and the Geological time scale and fossil record.
2.- Internalize the concepts of mineralogy, petrography, petrology.
3.- Apply the concepts of plate tectonics in seismicity volcanology, orography and continental margins. Educational formation to analyze a basic geological map

STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	20.00
Hours medium group	21,6	14.40
Self study	90,0	60.00
Hours small group	8,4	5.60

Total learning time: 150 h

CONTENTS

Topic 1

Description:
Introduction to the subject

Specific objectives:
Understand the operation of the subject, because it is important for CiTM and basic concepts

Full-or-part-time: 2h
Theory classes: 2h

Topic 2

Description:
Earth system, to a global vision

Specific objectives:
Interdependent vision of the subsystems of planet earth.

Full-or-part-time: 2h
Theory classes: 2h

Tema 3

Description:
Mineralogy and textures

Specific objectives:
Know the basic characteristics of rocks and use petrographic properties to recognise rock types.

Related activities:
Lab practices.

Full-or-part-time: 4h
Theory classes: 2h
Laboratory classes: 2h

Topic 4

Description:
External geodynamics
Learn to identify rocks

Specific objectives:
4.1 The external geodynamic cycle (introduction and concepts of weathering, erosion, transport and sedimentation and surface formation) (2 h)
4.2 Sedimentary rocks (detrital, carbonate, evaporitic, organic and hydrocarbons) (2h)
4.3 Slope processes, rivers, coasts, glaciers (2 h)
Learn to identify rocks

Full-or-part-time: 6h
Theory classes: 4h
Laboratory classes: 2h

Topic 5

Description:
Internal Geodynamics

Specific objectives:
5.1 Global tectonics and seismology
5.2 Structural geology (primary and secondary structures, folds, faults and diaclases, shear zones, fault zones)
5.3 Magmatic processes, igneous rocks and volcanism
5.4 Metamorphism and metamorphic rocks
Learn to identify rocks

Related activities:
Rock identification workshop

Full-or-part-time: 10h
Theory classes: 6h
Laboratory classes: 4h

Topic 6

Description:
Geological time

Specific objectives:
6.1 Introduction: the age of the earth
6.2 Relative dating of rocks and structures
6.3 Reconstruction of geological history
6.4 The scale of geological time
6.5 The Anthropocene, a time of challenges and planetary changes

Full-or-part-time: 11h
Theory classes: 1h
Practical classes: 10h

Topic 7

Description:
Morphology of the seabed

Specific objectives:
7.1 Morphotectonic units (ridges, ocean trenches, abyssal plains, etc.) 7.2 From sea to mountain: Morphology of continental margins (transition from ocean basins to the continent). The biggest drop on the planet

Full-or-part-time: 2h
Theory classes: 2h

Topic 8

Description:
The tsunamis

Specific objectives:
8.1 The Fukushima tsunami (eg) 8.2 When and where (spatial distribution and chronology) 8.3 Causes of tsunamis: 8.3.1 Subduction and major earthquakes. 8.3.2 The end of Atlantis. collapse of volcanic boilers. Santorini (former boiler collapse) 8.4 Tsunami warning system (monitor the Canary Islands)

Full-or-part-time: 2h
Theory classes: 2h

Topic 9

Description:
Marine Geological Prospecting

Specific objectives:
Geological prospecting techniques at sea

Full-or-part-time: 2h
Theory classes: 2h

Topic 10

Description:
Hydrogeology

Specific objectives:
10.1 What is an aquifer and groundwater
10.2 Groundwater flow. Aquifers as storage and transfer of water
10.3 Aquifers in coastal areas
10.4 Seawater intrusion and submarine groundwater discharge discharge

Full-or-part-time: 2h
Theory classes: 2h

Topic 11

Description:
Interdisciplinary view understanding the processes that take place in coastal areas and the different interactions ocurring between land and the sea as exchange of water flux, heat and nutrients, erosion, etc.

Specific objectives:
Understanding the complexity of the different geological and geodynamic processes that take place in coastal areas by understanding the different concepts presented during the course.

Full-or-part-time: 2h
Theory classes: 2h

Practices and maps

Description:
Topographic maps, orthophotomaps and Google Earth
Geological maps and profiles

Specific objectives:
Learn to use these tools and appreciate their potential
Learn to interpret geological maps and draw up geological profiles

Full-or-part-time: 10h
Practical classes: 10h

Workshops and seminars

Description:
Seminars
Workshops for resolving doubts and defending practical work

Specific objectives:
Assessment of cases and real applications of the acquired knowledge as well as of different subjects related with the asignatura and the degree
Workshops dedicated to solving doubts (theory + practices + works) as well as the presentation of the practical works in front of the rest of the students

Full-or-part-time: 6h
Practical classes: 6h

Partial exams

Full-or-part-time: 8h
Laboratory classes: 8h

GRADING SYSTEM

The qualification consists of the following subjects (percentages indicate the weight of the subject in the overall qualification):
1) Continuous assessment in the classroom (10%): attendance, attitude, assessment in theoretical classes, workshops, and seminars; geological map practices, test rock recognition practices.

2) Partial exams: a) Two theory exams (58%) b) a practical exam of geological maps (15%) and c) a rock recognition report (7%).

3) Preparation and presentation of practical work (10%).

The student will receive the qualification of "not presented" in the subject to the following cases: 1) unjustified absence to two practices, activities evaluable in class or deliverable within the designated dates, 2) absence of any examination.

Admission criteria for re-evaluation: Students suspended for regular assessment that have been submitted regularly to all the subject's evaluation tests will have the option to perform a re-evaluation test during the period set in the academic calendar. These tests must be authorized by the corresponding Head of Studies, at the request of the professor responsible for the subject, and will be re-enlightened within the corresponding teaching period. Students who have already passed the student's re-evaluation test will not be able to submit to the re-evaluation test of students who have already passed or qualified students as not present. The maximum grade in the case of presenting to the re-evaluation exam will be five (5.0). The non-attendance of a student summoned to the test of re-evaluation, celebrated in the fixed period will not be able to give rise to the accomplishment of another test with later date. Extraordinary assessments will be made for students who have not been able to carry out any of the continuous assessment tests because of their proven force majeure.

EXAMINATION RULES.

The student will receive the qualification of "not presented" in the subject to the following cases: 1) unjustified absence to two practices, activities evaluable in class or deliverable within the designated dates, 2) absence of any examination.

Admission criteria for re-evaluation: Students suspended for regular assessment that have been submitted regularly to all the subject's evaluation tests will have the option to perform a re-evaluation test during the period set in the academic calendar. These tests must be authorized by the corresponding Head of Studies, at the request of the professor responsible for the subject, and will be re-enlightened within the corresponding teaching period. Students who have already passed the student's re-evaluation test will not be able to submit to the re-evaluation test of students who have already passed or qualified students as not present. The maximum grade in the case of presenting to the re-evaluation exam will be five (5.0). The non-attendance of a student summoned to the test of re-evaluation, celebrated in the fixed period will not be able to give rise to the accomplishment of another test with later date. Extraordinary assessments will be made for students who have not been able to carry out any of the continuous assessment tests because of their proven force majeure.

BIBLIOGRAPHY

Basic:
- Tarbuck, E.J.; Lutgens, F.K.. Ciencias de la tierra: una introducción a la geología física [on line]. 10a ed. Madrid: Prentice Hall., 2015 [Consultation: 08/02/2023]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=3937. ISBN 9788490352816.
- Bastida, F. Geología: una visión moderna de las ciencias de la tierra. Gijón: Trea, 2005. ISBN 8497042026.
- Gutiérrez Elorza, M. Geomorfología [on line]. Madrid: Prentice Hall, 2008 [Consultation: 08/02/2023]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=1256. ISBN 991003402599706711.
- Seibold, E.; Berger, W. The sea floor An introduction to Marine Geology. 4rth ed. Cham: Springer, 2017. ISBN 9783319846439.

Complementary:
- Riba, O. Diccionari de geologia [on line]. Barcelona: Institut d'Estudis Catalans : Fundació puntCAT, 2008 [Consultation: 08/02/2023]. Available on: https://cit.iec.cat/obresx.asp?obra=DGEOL. ISBN 8441227934.