Universitat Autònoma de Barcelona

2023/2024

Basics of Geology

Code: 106749
ECTS Credits: 6

Degree	Type	Year	Semester
2504604 Environmental Sciences	FB	1	1

Contact

Name: Elena Druguet Tantiña

Email: elena.druguet@uab.cat

Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

Prerequisites

There are no prerequisites to take the subject.

Objectives and Contextualisation

It is a basic training course that develops the principles of geology from the perspective of understanding the real geological configurations and their interaction with the environment. In this course, the tools for identifying, describing and using the appropriate terminology on the aspects of geology that are closer or closer to the environmental sciences are offered.

Training objectives

1) To know the basic principles that make up the geological sciences, such as the distinction between matter and form, the different branches of geology and the respective objectives.

2) Recognize the main geological materials (minerals and rocks) and relate them to the processes that originate them.

3) Understand the value of geological configurations as registers of the evolution of the Earth and the processes that have originated them.

4) Know the basic techniques of graphic representation in geology (maps and geological cuts).

5) Know and evaluate the main phenomena and geological processes that have an impact on the environment and society (resources, risks and geological heritage).

Learning Outcomes

- CM03 (Competence) Work independently on resolving basic environmental problems and practical cases in the field of geology.
- CM04 (Competence) Transmit the basic mathematical information related to an environmental problem to the general public correctly.
- KM05 (Knowledge) Identify the basic relationship between the principles and foundations of Geology, in order to identify in turn the main geological processes that are involved in the environmental area.
- KM06 (Knowledge) Recognise the main interaction between the different planetary layers or spheres and their implications.
- KM07 (Knowledge) Recognise the main terrestrial processes that are involved at a global scale and in terms of planetary evolution.
- SM05 (Skill) Characterise the most abundant types of rock and minerals in the field and/or laboratory.
- SM06 (Skill) Deduce the temporary and spatial scales involved in environmental processes, using the principles and foundations of Geology.
- SM07 (Skill) Collect, analyse, measure and correctly represent data and observations from the field of geology.
- SM08 (Skill) Safely use techniques, material and tools for the analysis of samples and evidence from the field of geology in the field and the laboratory.

Content

Theoretical Contents

BLOCK 1: INTRODUCTORY ASPECTS

1. Presentation of the course. The geology Fields of study Environmental geology. Different aspects: resources, risks, geological heritage-geoconservation.
2. The globe. Physiographic regions of the planet. The lithosphere
3. Time in geology. The geological time scale. The geological cycles. Endogenous and exogenous processes.

BLOCK 2: THE LITHOSPHERE

4. Introduction to minerals and rocks. Rock-forming minerals. Compositional types. Mineral deposits.
5. The rocks. Composition and structure. Genetic grouping of rocks.
6. The internal heat of the Earth. magmatism Plutonism and volcanism. Volcanic hazard and risk. Examples of geoconservation.
7. The igneous rocks. Typology and classifications.
8. Mineral resources. Risks and environmental impact. Industrial rocks. quarries Geotermic energy. Examples of geoconservation of mining heritage.
9. Weathering, erosion and sedimentation. Sedimentary basins. Depositional environments. stratigraphy
10. The processes of lithification and diagenesis. Sedimentary rocks. Fossil fuels: coal and hydrocarbons. Environmental impact of their exploitation.
11. The fossil record. Evolution of life on Earth. Examples of geoconservation of the sedimentary and paleontological record.
12. Metamorphism and metamorphic rocks.

BLOCK 3: STRUCTURE AND DYNAMICS OF THE EARTH

13. The deformation of the rocks. Main deformation structures. Tectonic regimes and structural associations. Structures and applied geology. Examples of geoconservation of tectonic structures.
14. Global tectonics. Theory of plate tectonics.
15. Neotectonics. The earthquakes. Causes, distribution and effect. Seismic risk: prediction and management.
16. Geomorphology. Processes and agents. The modeling of the relief. Dynamics of slopes. Risks associated with relief modeling processes. Geological landscape andgeoconservation.
17.Hydrogeology.Dynamics of surface and underground waters. Fluvial environments. Hydrographic networks. aquifers Risk of flooding. Water resources. Impacts of groundwater extraction. Contamination of aquifers.

18. Coastal dynamics and environments. Coastal erosion problems.
19. Glaciers. Environments and glacial landforms. The glaciations
20. Paleoclimatology. Climate evolution. Climate change.
21. Evolution of geological knowledge. Geological heritage and environment. Geoconservation

Practical Contents - LAB-CLASSROOM PRACTICES

1. Distribution of rock types in Catalonia

2. The Map and the Geological Cross-section

3. Stratigraphic discontinuities, folds and faults. Representation in maps and cross-sections.

4. The geological history. Interpretation of geological configurations.

Practical contents - FIELD PRACTICES

Field trip to the Costa Brava and Garrotxa

Costa Brava: Formations and igneous and metamorphic rocks. Paleozoic basement and sedimentary cover.

Garrotxa: Neogene-Quaternary volcanism

Methodology

The subject consists of three modules of directed activities, programmed in an integrated way so that the student will have to relate throughout the entire semester the content and the programmed activities in order to achieve the skills indicated in section 5 of this guide. Thus, in accordance with the objectives of the subject, the development of the course is based on the following activities:

Participatory theoretical classes

Students acquire the specific knowledge of the subject by attending theoretical classes that are supplemented with simple questions and exercises that are interspersed with explanations. In this way, their active participation is encouraged so that the class does not become absolutely one-way.

Classroom practices

These are four practical sessions of 2 hours each that are interspersed with the theoretical classes and whose aim is for the student to connect the explanations with the real geological configurations. Basically it is about the recognition of rocks and structures and also getting familiar with the basic methods of representation (sections and geological maps). The practices must be presented to be evaluated. This work approach is aimed at promoting active learning and developing critical reasoning and the ability to analyze and synthesize.

Field practices

They consist of a one day field trip to the Costa Brava (morning) and the volcanic area of La Garrotxa (afternoon) which allows recognizing igneous (plutonic and volcanic), metamorphic and sedimentary structures and rocks. It also allows to recognize important episodes in the geological history of Catalonia through its records. Prior to the field trip, the student will receive a dossier that includes a map and the questions to be completed during the day. This dossier can be requested at the end of the field trip or within a week in order to be evaluated.

The autonomous activities of this subject are: study, reading of documents and realization of specific exercises delivered to theory class and / or practices. For a good follow-up of the subject, the student will have in the Virtual Campus of the subject all the necessary documentation.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Field trip	8	0.32	KM05, SM05, SM06, SM07, SM08, KM05
Lab practices	8	0.32	CM03, KM05, SM05, SM06, SM07, SM08, CM03
Lectures	37	1.48	CM04, KM05, KM06, KM07, SM06, CM04
Type: Supervised			
Exams and exercises	0.85	0.03	CM03, CM04, KM05, KM06, KM07, SM05, SM06, SM07, SM08, CM03
Type: Autonomous			
Autonomous activities	88.15	3.53	CM03, KM05, SM05, SM06, SM07, CM03

Assessment

The assessment will be based on a summation of different qualifications in order to achieve a continuous assessment.

The final evaluation and rating will be based on the sum of the evaluations of:

(1) field trip files: 10% (non-retrievable, non-inproveable)

(2) classroom practice file: 15% (non-retrievable, non-inproveable)

(3) theoretical-practical test of Blocks 1 and 2: 40% (retrievable, inproveable)

(4) theoretical-practical test of Block 3: 35% (retrievable, inproveable)

The weighted average will be obtained from the set of notes based on the specific weight of each of the parts.

To pass the subject by continuous assessment, you must have a minimum average of 5 and have appeared in all the tests and handed in all the coursework. To average the different parts, a minimum of 3.5 is required for each of the two partial tests (3 and 4).

Retrieval exam: If the previous requirement is not met or if the resulting final average is lower than 5, a retrieval exam can be taken on the date of the final assessment. To be able to attend it, students must have previously been assessed for continuous assessment activities that are equivalent to 2/3 of the final grade. The retrievable activities in this make-up exam will be activities (3) and (4). Students who have been approved by continuous assessment but who wish to improve their grade, may choose to do so on the same date as the final assessment, by communicating it by email to the teacher responsible for the subject 5 calendar days in advance of the exam date.

Single Evaluation Modality

Students who have chosen the single assessment modality must do:
- a single final exam that will include all the content equivalent to tests (3) and (4) previously mentioned for

continuous assessment.
- at the end of the exam, students will hand in the field (1) and classroom (2) practice documents.
The grade obtained will be the weighted average, where the theory exam willaccount for 75% of the grade, classroom practices 15% and field practices 10%.
Retrieval exam: If the final grade does not reach 5, the student will have another opportunity to pass the subject through the retrieval exam that will be held on the date set by the degree coordinator. In the same way as in the continuous assessment, the retrievable activities in this exam will be activities (3) and (4). Students who wish to improve their grades may also choose to do so on the same date as the final assessment.

Under no circumstances will students be able to pass the subject if they have not taken the field trips or if they have not submitted the classroom practices and documents.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Field trip report	10% - non-retrievable, non-inproveable	0	0	CM03, KM05, KM06, SM05, SM06, SM07, SM08
Lab practices	15% - non-retrievable, non-inproveable	0	0	CM03, CM04, KM05, SM05, SM06, SM07, SM08
Test Block 3 with theoretical-practical contents	35% - retrievable, inproveable	4	0.16	CM03, CM04, KM05, KM06, KM07, SM05, SM06, SM07
Test Blocks 1 and 2 with theoretical-practical contents	40% - retrievable, inproveable	4	0.16	CM03, CM04, KM05, KM06, KM07, SM05, SM06, SM07

Bibliography

BASIC BIBLIOGRAPHY:

Bell, F.G. 1998. Environmental Geology: Principles and Practice.
Diversos autors. 1985-1992. Història Natural dels Països Catalans. Vol. 1 i 2 Geologia, vol. 3 Recursos geològics i sòl.
Gass, I.G., Smith, P.H., Wilson, R.C.L. 1980. Introducción a las Ciencias de la Tierra.
Keller, E.A. 1999. Environmental Geology.
Murck, B.W., Skineer, B.J., Poster, P.C. 1996. Environmental Geology.
Pipkin, B. W. 1994. Geology and the Environment.
Reynolds, S.J., Johnson, J.K., Kelly, M.M., Morin, P.M., and Carter C.M., 2008. Exploring Geology.
Skinner, B.J., Porter, S.C., Botkin, D.B. 1999. The Blue Planet: An Introduction to Earth System Science.
Smith, D.G. (ed.). 1981. The Cambridge Encyclopedia of Earth Sciences.
Tarburck, E.J., Lutgens, F.K. 1999. Ciencias de la Tierra. Una introducción a la geología física.

PRACTICALS:

https://app.visiblegeology.com

https://www.see.leeds.ac.uk/fileadmin/Documents/Admissions/Masters/step-up/Introduction_to_maps.pdf

https://www.researchgate.net/publication/329934024_Geological_Structures_and_Maps_-_A_PRACTICAL_GUID

REGIONAL GEOLOGY:

Link to "Història Natural dels Països Catalans":
https://www.enciclopedia.cat/historia-natural-dels-paisos-catalans

Mapa geològic de Catalunya (escala 1: 250000). Servei Geològic de Catalunya.

Links tol "Mapa geològic de Catalunya":

https://www.icgc.cat/Administracio-i-empresa/Descarregues/Cartografia-geologica-i-geotematica/Cartografia-geo

https://betaportal.icgc.cat/visor/client_utfgrid_geo.html

Inventari d'espais d'interès geològic de Catalunya:
https://mediambient.gencat.cat/ca/05_ambits_dactuacio/patrimoni_natural/patrimoni-geologic/inventari_despais_d

Software

No specific software.