Universitat Autònoma de Barcelona

2022/2023

Geology

Code: 102848
ECTS Credits: 9

Degree	Type	Year	Semester
2501915 Environmental Sciences	FB	1	2

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Other comments on languages

Although the common language of the subject is Catalan, the use of scientific terminology in English is promoted

Teachers

Elena Druguet Tantiña

Joan Escuer Solé

Prerequisites

There are no prerequisites

Objectives and Contextualisation

Context

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).

Competences

- Adequately convey information verbally, written and graphic, including the use of new communication and information technologies.
- Analyze and use information critically.
- Collect, analyze and represent data and observations, both qualitative and quantitative, using secure adequate classroom, field and laboratory techniques
- Demonstrate adequate knowledge and use the most relevant environmental tools and concepts of biology, geology, chemistry, physics and chemical engineering.
- Demonstrate concern for quality and praxis.
- Demonstrate initiative and adapt to new situations and problems.
- Learn and apply in practice the knowledge acquired and to solve problems.
- Quickly apply the knowledge and skills in the various fields involved in environmental issues, providing innovative proposals.
- Teaming developing personal values regarding social skills and teamwork.
- Work autonomously

Learning Outcomes

1. Adequately convey information verbally, written and graphic, including the use of new communication and information technologies.
2. Analyze and use information critically.
3. Demonstrate concern for quality and praxis.
4. Demonstrate initiative and adapt to new situations and problems.
5. Describe the basics of geology and recognize the laboratory and in the field the main types of rocks as well as the most abundant minerals.
6. Distinguish the basic relationships between geology and environmental problems, and assess global environmental change from geological perspective and its implications.
7. Distinguish the interactions between the various layers or areas of the planet.
8. Identify and map geological processes in their spatial and temporal dimensions.
9. Identify the geological processes in the environmental surroundings and to value properly and originally.
10. Integrate the various terrestrial processes on a global scale and in terms of planetary evolution.
11. Learn and apply in practice the knowledge acquired and to solve problems.
12. Observe, recognize, analyze, measure and properly and safely represent geological processes.
13. Teaming developing personal values regarding social skills and teamwork.
14. Work autonomously

Content

Theoretical contents

BLOCK 1: INTRODUCTORY ASPECTS

1. Presentation of the course. Geology. Areas of study. Environmental geology. Different aspects: resources, risks and geoconservation.

2. The globe. Physiographic regions of the planet. The lithosphere.

3. Time in geology. The geological time scale.

4. The geological cycles. Endogenous and exogenous processes. Geological heritage and geoconservation.

BLOCK 2: THE LITHOSPHERE

5. Introduction to minerals and rocks. Rock forming minerals. Compositional types. Mineral deposits. Mineral resources. Risks and environmental impact. Examples of geoconservation.

6. The rocks. Composition and structure. Genetic grouping of rocks.

7. Magmatism: plutonism and vulcanism. Igneous rocks. Geotermic energy. Industrial rocks. Quarries. Volcanic risk. Examples of geoconservation.

8. Wheathering, erosion and sedimentation. Stratigraphy. Sedimentary environments.

9. Litihification and diagenesis processes. Sedimentary rocks. The fossil record. Fossil fuels: coal and hydrocarbons. Examples of geoconservation.

10. Metamorphism. Metamorphic rocks. Examples of geoconservation.

BLOCK 3: STRUCTURE AND DYNAMICS OF THE EARTH

11. The deformation of the rocks. Main deformation structures. Structural associations. Ranges and basins. Importance of structures in geotechnics. Examples of geoconservation.

12. Global tectonics. Kinematics of lithospheric plates and consequences.

13. Neotectonic. Earthquakes Causes and distribution. Seismic risk: earthquakes and tsunamis. Prediction and mitigation.

14. Geomorphology. Processes and agents. Dynamics of slopes. Risks associated with geomorphological processes. Geological landscape and geoconservation.

15. Hydrogeology. Dynamics of surface and underground waters. Fluvial environments. Hydrographic networks. Aquifers. Flood risk. Water resources. Impacts of the extraction of groundwater. Contamination of aquifers.

16. Dynamics of seas and oceans. Coastal environments. Coastal erosion problems.

17. Glaciers and glaciers environments. Glaciations

18. Paleoclimatology. Clima evolution. Climate change.

Practical Content

CLASSROOM PRACTICES

1. Distribution of the types of rocks in Catalonia

2. The map and the geologic cross-section: lithological, structural and geomorphological features

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

4. Interpretation of geological configurations (diagrams, maps, cuts and photographs). Geological history

5. Geological cross-sections from real geological maps.

FIELD PRACTICES

1. Costa Brava - Garrotxa itinerary: igneous formations and rocks

2. Itinerary Figaró - Cingles del Bertí: Paleozoic basement and Mesozoic and tertiary sedimentary cover.

Methodology

The Geology course consists of three modules of supervised activities, programmed in an integrated way, so that the student will have to relate throughout the semester the content and activities programmed in order to achieve the competences indicated in the 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 lectures:

The student acquires the own knowledge of the subject attending the lectures that are complemented with questions and simple exercises that are interrelated with the explanations. In this way, an active participation of the student is pursued so that the class does not become absolutely unidirectional.

Classroom practices:

It consists of 5 practical sessions of 2 hours each one that are interlaced with the theoretical classes and which aim to connect the student to the explanations with the real geological configurations. Fundamentally it is about the recognition of rocks and structures and also familiarize yourself with the basic methods of representation (cutting and geological maps, triangles). The practices must be presented at the end of each practice to be evaluated. This approach to work is aimed at promoting active learning and developing critical reasoning and the ability to analyze and synthesise.

Field trips:

They consist of two field trips. The first one, in the volcanic area of La Garrotxa (morning) and in the Costa Brava (afternoon), allows to recognize structures and igneous rocks. The second is the classic Figaró-Cingles del Bertí itinerary that recognizes the materials and structures of the Paleozoic basement and the mesozoic and tertiary sedimentary cover in Catalonia. For the two excursions, the student will previously receive a field guide that includes a map and the questions that will have to be completed in the field. This dossier may be requested at the end of the field trip, although the delivery of the totality to be qualified will be done within the term indicated after the excursion is finished.

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			
Classroom practices	10	0.4	11, 3, 5, 6, 8, 12, 1, 14, 13
Field trips	15	0.6	2, 11, 4, 3, 5, 7, 6, 9, 8, 10, 1, 14, 13
Lectures	50	2	11, 3, 5, 6, 9, 8, 12, 1, 14, 13
Type: Supervised			
Tests and exercises	29	1.16	2, 11, 4, 3, 6, 8, 10, 12, 1, 14
Type: Autonomous			
Independent activities	72	2.88	2, 11, 4, 3, 14

Assessment

The evaluation will be based on a summary of different qualifications in order to achieve a continuous evaluation.

The final assessment and qualification will be based on the sum of the evaluations of (1) dossiers of field trips, (2) dossier of the classroom practices, (3) theoretical-practical test of Blocs 1 and 2 and (4) theoretical-practical test of Block 3. The weighted average will be obtained from the set of notes based on the specific weight of each of the parts (proportional to the number of hours spent).

To pass the subject for continuous evaluation, it will be necessary to have a minimum average mark of 5 and have done all the tests, participated in the field trips and have delivered all the exercises in time. To get an average mark from different parts requires at least a mark of 3.5 of each part. In no case will the student be able to pass the subject if he has not carried out the field trips or if he has not delivered the classroom exercises and the dossiers.

Resit: If the previous requirements are not fulfilled or if the resulting final average mark is less than 5, a resit test can be performed on the date of the final evaluation. In order to be able to attend the resit exams, the student must have been previously evaluated of continuous assessment activities that are equivalent to 2/3 of the final mark. The recoverable activities in this final examination will be the activities (3) and (4). Students approved by continuous evaluation but who wish to improve their mark may choose to do so on the same date as the final assessment.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Classroom practices	25%	20	0.8	2, 11, 3, 5, 8, 12, 1, 14, 13
field trips dossiers	15%	20	0.8	11, 4, 3, 5, 6, 9, 8, 12, 1, 14, 13
test Block 3 with theoretical content and questions on field trips	30%	4.5	0.18	2, 11, 3, 5, 7, 8, 10, 12, 1
test Blocks 1 and 2 with theoretical-practical contents	30%	4.5	0.18	2, 11, 3, 5, 7, 8, 10, 12, 1

Bibliography

BASIC BIBLIOGRAPHY:

Bell, F.G. 1998. Environmental Geology: Principles and Practice. Blackwell Science, Oxford.

Gas, I.G., Smith, P.H., Wilson, R.C.L. 1980. Introduction to Earth Sciences. Ed. Reverté, Barcelona.

Keller, E.A. 1999. Environmental Geology. Prentice Hall. New Jersey. 560 p. (fourth edition 2008).

Murck, B.W., Skineer, B.J., Poster, P.C. 1996. Environmental Geology. John Wiley & Sons, New York.

Pipkin, B. W. 1994. Geology and the Environment. West Publishing Company, St. Paul, Minnesota.

Reynolds, S.J., Johnson, J.K., Kelly, M.M., Morin, P.M., and Carter C.M., 2008. Exploring Geology: McGraw-Hill Higher Education, Dubuque, Iowa.

Serra, J., Font, X. (coords.). 1998. Environment and Geology. Notebooks of Applied Ecology 15. Diputació de Barcelona, Barcelona.

Skinner, B.J., Porter, S.C., Botkin, D.B. 1999. The Blue Planet: An Introduction to Earth System Science (2nd ed.). John Wiley & Sons.

Smith, D.G. (ed.). 1981. The Cambridge Encyclopedia of Earth Sciences. Cambridge Univ. Press, London / New York.

Tarburck, E.J., Lutgens, F.K. 1999. Earth Sciences. An introduction to physical geology. Prentice Hall, Madrid.

PRACTICAL:

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:

Several authors. 1985-1992. Història Natural dels Països Catalans. Vol. 1 i 2 Geologia, vol. 3 Recursos geològics i sòl. Ed. Enciclopèdia Catalana, S.A., Barcelona.

Link to the "Història Natural dels Països Catalans":

https://www.enciclopedia.cat/historia-natural-dels-paisos-catalans

Geologicalmap of Catalonia (scale 1: 250000). Geological Service of Catalonia:

Links to the "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

Inventory of spaces of geological interest in Catalonia:

http://mediambient.gencat.cat/ca/05_ambits_dactuacio/patrimoni_natural/sistemes_dinformacio/inventari_despais

Software

No specific software