Universitat Autònoma de Barcelona

2021/2022

Basic Geology

Code: 101039
ECTS Credits: 8

Degree	Type	Year	Semester
2500254 Geology	FB	1	A

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

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

Prerequisites

None

Objectives and Contextualisation

Subject of basic training with contents coordinated with other subjects of the first course. It deals with the fundamental aspects of the different fields of study of geology with emphasis on the identification of the different types of geological record, both those related to the genesis of rocks, and those associated with their internal and external transformations. Its objective is to introduce clearly and rigorously the student in the different aspects and fields of geology, so that, upon finishing the course, the student will know the basic concepts that will serve him or her in the future throughout the course of the career.

Competences

- Display understanding of the fundamental principles of geology and the ability to identify the basic types of minerals, rocks and structures.
- Display understanding of the size of the space and time dimensions of Earth processes, on different scales.
- Learn and apply the knowledge acquired, and use it to solve problems.
- Suitably transmit information, verbally, graphically and in writing, using modern information and communication technologies.

Learning Outcomes

1. Describe the basic concepts of geology.
2. Describe the fundamental principles of Earth processes and their time and space scales.
3. Learn and apply the knowledge acquired, and use it to solve problems.
4. Recognise in the laboratory and in the field the principal types of rocks and structures and the most common minerals.

5. Suitably transmit information, verbally, graphically and in writing, using modern information and communication technologies.

Content

GROUP 1: INTRODUCTION AND BASIC CONCEPTS

Introduction and objectives of geology. A vision of the Earth: Hydrosphere, atmosphere, biosphere, solid earth. The origin of the planet. Formation of the layered structure of the Earth: layers defined by their composition and by their physical properties. Characteristics of the continents and ocean floor. The basic types of rocks.

GROUP 2: THE PLATE TECTONICS

Main tectonic plates of the Earth. Plate limits.

Divergent plate boundaries: the ocean ridges and the expansion of the ocean floor. The fragmentation of the continents.

Convergent plate boundaries: ocean-ocean convergence, ocean-continent convergence, continent-continent convergence.

Transform plate boundaries.

Forces that drive tectonic plate movement.

Convection models plate-mantle.

GROUP 3: THE IGNEOUS ROCKS

The genesis of magmas: causes and context in which they are formed. Geotectonic context of igneous activity. Evolution and diversification of magmas.

Main Igneous rock forming minerals. Classification of igneous rocks: textural, compositional (mineralogical and chemical). Modal classification of volcanic and plutonic rocks.

Vulcanism: location of volcanoes in relation to tectonic plates. Main volcanic structures and type of eruptions. Location of Tertiary and Quaternary volcanism in Europe.

Recent eruptions and weather.

Plutonic and subvolcanic rocks. Main plutonic structures. Relationship between plutonic and volcanic structures.

GROUP 4: EXTERNAL PROCESSES OF THE EARTH. SEDIMENTARY ROCKS AND STRATIGRAPHIC AND SEDIMENTOLOGICAL RECORDS.

External processes of the Earth. Mechanical meteorization, chemical weathering. Soils and their formation factors: mother rock, weather, climate, topography, biosphere.

Sedimentary rocks: classification criteria. Main types of sedimentary rocks: detrital sedimentary rocks, sedimentary rocks of chemical origin. Classification of sedimentary rocks. Sedimentary environments. Sedimentary structures. Economic interest of sedimentary rocks.

GROUP 5: DEFORMATION OF THE ROCKS

Structural geology: study of terrestrial architecture.

Deformation: Stress types. Deformation: how rocks are deformed.

Mapping of geological structures. Stike and dip direction.

Folds: types of folds. Domes and basins. Growth strata.

Faults and fractures: normal faults, reverse faults and thrusts. Faults with horizontal displacement. Joints. Transform faults.

Salt tectonics: diapirs and other halokinetic structures. Minibasins and halokynetic strata.

GROUP 6: METAMORPHISM AND METAMORPHIC ROCKS

Metamorphism. Definition, protolith and metamorphic rock. Metamorphism factors. Metamorphic sequences. Metamorphic textures, Minerals that form metamorphic rocks.

Common metamorphic rocks; foliated rocks vs. non-foliated rocks.

Type of metamorphism: regional, contact, etc. Metamorphic zonation. Metamorphism and genesis of magmas. Metamorphism and plate tectonics.

GROUP 7: GEOMORPHOLOGICAL PROCESSES ON THE SURFACE OF THE EARTH

Surface water flows. Erosion, transport and deposit of sediments. Fluvial valleys and drainage networks. Floods and flood control.

Glaciers and glaciations. Forms created by glacial erosion. Causes of glaciations.

Deserts and winds: geological processes in arid climates. Erosion, transport and deposit of wind sediments. Wind deposits.

Coast lines. Wave characteristics. Erosion caused by waves. Characteristic and classification of the coasts.

Methodology

The center of the learning process is the student's work. The student learns by working, being the teacher's mission to help him in this task (1) by supplying him with information and showing him the tools to achieve it and (2) directing his steps so that the learning process can be carried out effectively. In line with these ideas, and in accordance with the objectives of the subject, the development of the course is based on the following activities:

Master classes:

The student acquires the knowledge of the subject by attending master classes that are complemented with questions and simple exercises that are interspersed with the explanations. In this way an active participation of the student is pursued with the purpose that the class is not completely unidirectional.

Personal work:

The master classes will be complemented with a part of personal and autonomous work outside the classroom for which the students will be provided with didactic material that they will have to work autonomously. This part will include the proposal of different exercises that the students will have to deliver for their evaluation.

Cabinet practices:

They are interspersed within blocks 2, 3, 4, 5, 6 and 7, and have as their objective that the students connect the explanations with the real geological configurations. Fundamentally it is about the recognition of rocks and structures and their classification, etc. The practices will be materialized with the creation of dossiers that should be presented at the end of each block to be evaluated.

This work approach is oriented to promote active learning and to develop critical reasoning and the ability to analyze and synthesize.

Field work:

This will be carried out in the area of Figaró-Cingles de Bertí. Before and during the exit the student will receive information and proposal of exercises about the area that he/she will have to compile in a notebook forits evaluation. Special emphasis will be placed on the importance of the field notebook as a basic work tool in which the different field observations need to be well georeferenced and documented.The dield notebook may be requested in whole or in part at the end of the exit, although the delivery of the totality for its qualification will be made after the field trip.

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 work	7	0.28	3, 2, 1, 4, 5
Laboratory practices	14	0.56	3, 2, 1, 4, 5
Lectures	47	1.88	2, 1, 5
Type: Autonomous			
Autonomous activities	122	4.88	3, 2, 1, 4, 5

Assessment

1. The evaluation will be based on the weighted summation of the qualifications obtained in the different exams (72% of the total) to be carried out at the end of each thematic group, of the evaluation of the laboratory or cabinet practices dossiers and the exercises of personal work (14% of the total) and the qualifications of the field work (14% of the total). A minimum qualification of 2.5 in each evaluation element will be required.

The weight of each exam will be proportional to its weight in the total program.

2. The qualification of the field practice (14% of the total) will be based on the materials delivered but also on the behaviour of each student in the field.

3. Final test: the final test is compulsory for all students who lack a qualification in one of the thematic groups (not presented) and for all those who do not pass a weighted grade of 5. Students can choose to present themselves to those parties in which they wish to improve the grade.

4. According to the regulations of the faculty, if a student has completed more than 35% of the evaluation activities, it can not be stated as not presented.

5. The non-attendance to the practices (cabinet and field) and / or the non-presentation of the dossier of practices will be penalized with 2 points.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Class exercices	0	0	0	3, 2, 1, 4, 5
Field work evaluation (dossier)	14	0	0	3, 2, 1, 5

Final recovery test	depending on the recovered parts	0	0	3, 2, 1, 4, 5
Practical laboratory / cabinet evaluation (dossier)	14	0	0	3, 2, 1, 4, 5
Test of each thematic group	72	10	0.4	3, 2, 1, 4, 5

Bibliography

Basic bibliography:

Ciencias de la Tierra 2013 (10th Edition) F.K. Lutgens, & E.J. Tarbuck. Pearson Educación. Prentice Hall. Hi ha un CD de la vuitena edición. Aquest llibre i Cds es troben a la Biblioteca de Ciències de la UAB.

Other useful books:

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

Geology 2006 (4th Edition) S. Chernicoff & D. Whitney, Prentice Hall.

The Changing Earth: Exploring Geology and Evolution 2005, J. S. Monroe & R.Wicander Brooks/Cole Pub Co.

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

Physical Geology 1996 (7th Edition)1996, Ch.C Plummer, D. McGeary & D.Carlson McGraw-Hill.

Understanding Earth 1993 (3rd Edition) F. Press & R. Siever, W H Freeman.

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

Introducción a las Ciencias de la Tierra, 1980 Gass, I.G., Smith, P.H., Wilson, R.C.L., Ed. Reverté, Barcelona.

Of regional interest are:

Història Natural dels Països Catalans 1990, Folch, R. (Ed.). Enciclopedia Catalana, S. A. Barcelona. Volums de Geologia I i II

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

Software

During the development of this course, the following applications may be used:

Googleearth

Field move Clino (Petroleum experts) - or any similar application with compass and clynometre function for cell phone and tablet.

Inkscape - or any other similar graphic design application.