

**Planet Earth**

Code: 101044  
ECTS Credits: 4

Degree	Type	Year	Semester
2500254 Geology	OB	1	1

**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

**Teachers**

Eduard Remacha Grau  
Gisela Leoz Munte

**Prerequisites**

Basic notions of Physics and Chemistry are recommended as well as a sufficient level of at least written comprehension.

**Objectives and Contextualisation**

Basic understanding of the fundamental concepts about:

- The Earth as a system and the interactions that occur between the solid Earth and the atmosphere, hydrosphere and biosphere.
- The origin and evolution of the Universe, the formation of the Earth and the solar system.
- The solid Earth and its internal structure.
- The time variable in Geology.
- Earth Dynamics and Tectonic Plates.
- Atmosphere and Hydrosphere.
- Interaction between atmosphere, hydrosphere and solid Earth. Climatic change.
- The search for energy and sustainable development.
- An example of geological cycle: the C cycle.

**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.

- Recognise, depict and reconstruct tectonic structures and the processes that generate them and relate types of rocks and structures to geodynamic environments.
- Suitably transmit information, verbally, graphically and in writing, using modern information and communication technologies.

## Learning Outcomes

1. Discern the basic relationships between geology and the problems of environmental change.
2. Discern the interactions between the various layers or spheres of the planet.
3. Relate the geodynamic significance of structural, petrogenetic and surface processes to the framework of plate tectonics.
4. Suitably transmit information, verbally, graphically and in writing, using modern information and communication technologies.

## Content

1 - The Earth System: Origin of the Universe, the Solar System and planet Earth. Composition and differentiation  
The Big Bang, formation of Galaxies, types of Galaxies, evolution, formation of the Earth

2 - The solid Earth and its internal structure. 2h.  
Early evolution of the Earth and its composition, sources of information and evidence

3 - The Time variable in Geology. 6h.  
The variables space and time from a geological perspective. Relative age dating

4 - Earth Dynamics and Tectonic Plates.

Hypothesis of continental drift. Plate Tectonic theory. Types of plate boundaries. Origin and movement of lithospheric plates

5 - Atmosphere and Hydrosphere 8h.  
Composition of atmosphere, solar radiation, temperature, atmospheric humidity, greenhouse effect, water cycle,  $H_2O$  cycle, continental and oceanic waters. The Cryosphere. The energy balance. The Atmosphere: its interaction with the hydrosphere. El Niño and southern oscillation (ENSO), Other fluctuations in ocean temperatures and its relation with climate changes. Influence of climate change on the hydrosphere

6 - The search for Energy and Sustainable Development. 2h.

The role of geologists in the front of increased demand for energy resources. Exhaustion of fossil energy resources

7 - An example of a geochemical cycle: The Carbon cycle. 2h.  
 C and life on Earth. C and climate. The C cycle: C reservoirs, flows and t

## Methodology

Theory:

- Oral presentation by the teacher.

Seminars:

- Sismology I. Seismic Waves. Epicenter and magnitude of earthquakes.

- Sismology II. Spatial and temporal distribution of seismicity on Earth. Information and databases. Seismic software  
 earthquakes related to volcanic activity: the example of the  
 El Hierro eruption. Evolution of seismicity during a major earthquake.

- Geological time I: Examples for understanding of the spatial and tempo
- Geologic time II: Making geological time scales using the main events c
- Carbon cycle on Earth: Models of the recent C cycle.
- Seminars / additional / alternative exercises:

Characterization of plate boundaries using structures and volcanism, Plate Tectonics, paleogeography. Calculati  
 \* teachers can introduce a compulsory presentation of a dossier or relate

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Seminars	6	0.24	2, 1, 3, 4
Theory	28	1.12	2, 1, 3, 4
Type: Autonomous			
Autonomous work	58	2.32	2, 1, 3, 4

## Assessment

Continuous evaluation (CE):

2 exams (which will include the contents of the theory as well as those of  
 1st exam: Theory subjects 1 to 4 + Seminars of Seismicity, Geological Ti  
 2nd exam

: Theory subjects 5 to 8 + Seminars on the C cycle, El Niño (ENSO), \*. test questions of the theory topics 2nd pai

Work / Dossiers on the seminars carried out or other exercices proposed by the professors. You have to present

Continuous evaluation mark (CE mark) = grade on 1st theory exam x 0.4  
grade on 2n theory exam x 0.4 + grade on Dossiers / works x 0.2

To pass the subject by continuous evaluation the CE grade must be equi

Final Exam:

The final exam will consist of two parts:

1: Recovery of the first exam (theory and seminars) i

2: Recovery of the second exam (theory and seminars).

In the event that a grade lower than that obtained in the corresponding p

If, in any of the two theory exams the grade remains below 3, the final gr

Students with a grade of fail or non presented to any of the exams must j

Students who wish to improve the grades of one or two parts in the final c

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
1st Exam (Themes 1-4 + seminars)	40% of total EC grade	3	0.12	2, 1, 3, 4
2n Exam (Themes 5 - 8)	40% of total EC grade	3	0.12	2, 1
Final Exam	The same as each previous exams	2	0.08	2, 1, 3, 4

## Bibliography

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Ciencias de la Tierra: Una introducción a la geología física. Tarbuck, Edward J., Madrid [etc.] : Prentice Hall, cop. 2000. Capítulo 2: Tectónica de placas: el desarrollo de una revolución científica. 33-75.

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Origen e Historia de la Tierra. Francisco Anguita Virella, Editorial Rueda, Madrid. ISBN: 8472070522 ISBN-13: 9788472070523, 1ª ed. edición (09/1988), 445 pags.

Understanding the Earth. Grotzinger, J. and Jordan, T., 2010. 6th. Ed. W. H. Freeman & Co., NY.

Earth and Life. The Dynamic Earth. S269 DE Science: a second level course. S269 Course Team. The Open University. 1997.

The Blue Planet. An Introduction to Earth System Science. Brian J. Skinner, Stephen C. Porter and Daniel B. Botkin., 1999. 2nd. Ed. John Wiley & Sons, Inc.