Universitat Autònoma de Barcelona

**2023/2024**

# Biology and Geology

Code: 44328
ECTS Credits: 10

| Degree | Type | Year | Semester |
|---|---|---|---|
| 4310486 Teaching in Secondary Schools, Vocational Training and Language Centres | OT | 0 | A |

## Contact

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## 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.

## Teachers

Joan Bach Plaza

Francesc Xavier Roque Rodriguez

Carlos Tabernero Holgado

Monica Pujol Canadell

Sandra Saura Mas

Sergi Grau Torras

## Prerequisites

No requirements

## Objectives and Contextualisation

GOALS

The aim of the course is to complete the knowledge of future science teachers of biology and geology graduates, engineering graduates or future science teachers.

The module "Biology and Geology" is divided into two parts: History of Science (4cr) and Fundamentals of Biology and Geology (6cr).

## Competences

- Acquire strategies to encourage student effort and enhance their capacity to learn by himself and others, and develop thinking skills and decision-making to facilitate autonomy, confidence and personal initiative.
- Communicate effectively both verbally and non-verbally.
- Design and develop learning spaces with special attention to equity, education and emotional values, equal rights and opportunities for men and women, civic education and respect for human rights that facilitate life in society, decision making and building a sustainable future.
- Generate innovative and competitive professional activities and research.
- Know the curricular content of the matters relating to the appropriate teaching specialization and the body of didactic knowledge around the respective teaching and learning.
- Make effective use of integrated information and communications technology.
- Own the learning skills necessary to carry out continuous training, both in content and teaching specialty, as in the general aspects of teaching.
- Plan, develop and evaluate the teaching and learning process enhancing educational processes that facilitate the acquisition of the competences of the respective teachings, based on the level and previous training of students as well as the orientation of the same, both individually and in collaboration with other teachers and school professionals
- Search, obtain, process and communicate information (oral, printed, audiovisual, digital or multimedia), transform it into knowledge and apply it in the teaching and learning in their own areas of specialization.
- know the processes of interaction and communication in the classroom, mastering social skills and abilities necessary to encourage learning and coexistence in the classroom, and address problems of discipline and conflict resolution.

## Learning Outcomes

1. Communicate effectively, both verbally and non-verbally.
2. Create a climate that facilitates interaction and values the contributions of students to promote the learning of Biology and Geology in the classroom.
3. Demonstrate knowledge of contexts and situations in which they are used and Biology and Geology that composen the curriculum of Compulsory Secondary Education and Baccalaureate apply, highlighting its functional character and analyzing his impact on the current world.
4. Demonstrate knowledge of cultural and educational value of Biology and Geology and the contents of these disciplines taught in Secondary Education and Baccalaureate, and integrate this content in the framework of science and culture.
5. Demonstrate knowledge of the Biology and Geology curricula in the Secondary School and Baccalaureate.
6. Demonstrate knowledge of the history and recent developments in Biology and Geology and his perspectives to convey a dynamic view of the same and make sense of the Biology and Geology School, highlighting the historical genesis of knowledge of both sciences.
7. Demonstrate knowledge of the theoretical and practical developments in teaching and learning of Biology and Geology.
8. Design and develop learning spaces with special attention to equity, education and emotional values, equal rights and opportunities between men and women, civic education and human rights that facilitate life in society, decisions and building a sustainable future.
9. Generate innovative and competitive proposals for research and professional activities.
10. Know the processes of interaction and communication in the classroom, mastering social skills and abilities necessary to encourage learning and coexistence in the classroom, addressing issues of discipline and conflict resolution.
11. Possess learning skills necessary to carry out continuous training in both content and didactics of Health, as well as general aspects of teaching.
12. Search, obtain, process and communicate information (oral, printed, audiovisual, digital or multimedia) to transform it into knowledge and apply it in the teaching-learning materials specific to the specialization studied.
13. Use information and communications technology and integrate them into the teaching and learning of Biology and Geology.

## Content

The module "Biology and Geology" is divided into two parts: History of Science (4cr) and Fundamentals of Biology and Geology (6cr divided by: Fundamentals of Biology 3cr and Fundamentals of Geology 3cr).

History of Science (4cr)

Through critical analysis of authors and relevant episodes, the student will acquirea basic historical scientific culture,applicable to secondary education.

1. What is science? Where is the History?

2. Origins

3. Gravity

4. Instruments

5. Elements

6. Microorganisms

7. Evolution

8. Frankenstein or the modern Prometheus

9. Workshop: Einstein and the experience of relativity

10. Workshop: Curie and the memory of radioactivity

11. Workshop: Individual, information and society

12. Workshop: Chaos, order and dinosaurs

Each session is dedicated to a topic and will present and discuss the proposed readings on the Virtual Campus.

Fundamentals of Biology and Geology (6cr)

Work on fundamental contents of biology and geology to supplement the initial training of future teachers of physics and chemistry. Students will attend two disciplinary basis of 3 credits depending on their initial training.

The distribution will be:

- Geologists and related areas will take fundamentals of Biology and Physics

- Biologists and related areas will take fundamentals of Chemistry and Geology

Contents to study are:

Fundamentals of Biology (3cr)

- The Chemistry of Life: Chemical Components of the Cell. Bioelements. Organic molecules. Introduction to metabolism.

- The cell: The prokaryotic and eukaryotic cell. Organization models. Cell division. Viruses and bacteria.

- Foundations of inheritance: Classical genetics. Mendel's laws. Sex-linked inheritance. Identification of DNA as the carrier of genetic inheritance Humana (Human Genome). Alterationsof the genome.

- Organisms and systems. Levels of ecological organization. Basic principles of ecology.

Fundamentals of Geology (3cr)

- Geology as a science. The Earth as a complex system.

- Terrestrial materials: rocks, minerals. The rock cycle. Classification and identification.

- The internal structure and terrestrial changes: global tectonics, earthquakes, volcanoes, deformation and tectonic structures, the landscape as an interaction between internal processes and external processes. Geohazards.

- Field work: visit to the Sant Jaume creek area. History of the Earth and Geology of Catalonia: stratigraphic record, geological time, sedimentary environments, dating and fossils.

- Geological maps: map elements, maps and geological sections, geological history.

Future teachers of physics and chemistry will participate in two interdisciplinary projects with future teachers of biology and geology, one project is related to biology and chemistry content, and the other to physics and geology content. These projects are worked on interdisciplinary groups during three sessions.

Interdisciplinary Project of Biology and Chemistry

This is a transversal activity of "Fundamentals of Biology" and "Fundamentals of Chemistry", it is scheduled to be done in groups.

Interdisciplinary Project of Physics and Geology

This is a transversalactivity of "Fundamentals of Physics" and "Fundamentals of Geology", it is scheduled to be done in groups.

## Methodology

The hours indicated for each of the training activities are indicative and can be modified slightly depending on the schedule or the teaching needs.

In classroom activities, students will be proposed to work in small groups to promote the maximum participation of all students.

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 | | | |
| Assistència i participació a les classes magistrals, pràctiques de laboratori, sortides, etc, i la realització i avalaució d'activitats relacionades | 65 | 2.6 | 12, 1, 10, 4, 5, 7, 6, 9, 11 |
| Type: Supervised | | | |

| | | | |
|---|---|---|---|
| Revisió, realització i avaluació de treballs (informes, estudis de cas, resolució de problemes, exposicions, pràctiques de laboratori, treballs de camp, ...) | 65 | 2.6 | 1, 3, 5, 8, 13 |
| Type: Autonomous | | | |
| Anàlisis de lectures i propostes d'innovació didàctica, realització d'informes, disseny d'activitats, anàlisis i resolució de casos | 120 | 4.8 | 12, 10, 2, 3, 4, 5, 7, 6, 9, 11, 13 |

## Assessment

Evaluation criteria

Attendance at the sessions is recommended to ensure the monitoring of the subjects and to carry out tasks or activities on site. Attendance in a percentage greater than or equal to 80% together with an attitude of active listening and respectful participation is a requirement for the ordinary evaluation of the subject.

To pass the Biology and Geology module you must have passed each of the parts and each of the topics that make it up and that will be taken independently.

The continuous evaluation of each of the topics in the block includes group activities and individual activities. In order to make an average, at least a 4 must be taken from each of the activities planned to be evaluated and which the teaching staff will indicate beforehand.

Throughout the part of the module taught by each teacher, additional tasks can be requested without necessarily being considered assessment tasks, but mandatory delivery.

In case of requesting through the official academic channels the single assessment, this will include the presentation of the works of each of the blocks, on May 17, 2024.

The recovery of both the continuous and the single assessment will consist of the repetition of the work designated by the teachers of each block, the presentation will be on June 14, 2024.

Assignments will be delivered primarily through the virtual campus. Other delivery methods may be enabled, prior agreement with the teaching staff, informed in person in class and via virtual campus or moodle. Papers delivered by means not agreed with the teacher will not be accepted, nor papers with incorrect formats, that do not include the name of the authors and the subject they refer to or that are sent after the deadline.

Since the vehicular language of the master's degree and secondary education is Catalan, the oral and written tasksrelated to this module must be presented in this language.

Assignments and exams will be evaluated no later than 1 month after their delivery or completion.

In accordance with UAB regulations, plagiarism or copying of any work will be penalized with a 0 as a qualification, losing the possibility of recovering it, whether it is an individual or group work (in this case, all members of the group will have a 0).

History of Science

To evaluate the History of Science sessions, the student will have to write 4 individual short papers of 500 words (maximum length) on the questions raised in the sessions. The delivery dates will be specified on the first day of class.

For the qualification we will take into account 1) the clarity and the writing of the text; 2) the relationship of the argument with the content of the sessions and 3) the suggested readings.

Fundamentals of biology

To evaluate the fundamentals of Biology sessions, the following must be presented:

- Specific activities to apply the content studied, such as the answer to some questions in the PAU exams and the preparation of a question based on the topic worked on in class (Individual 35%).

- Interdisciplinary Chemistry and Biology Project (group 65%). Delivery date: 06/05/2024

Fundamentals of geology

To evaluate the fundamentals of Geology sessions, you must present:

- An interpretation work of the field work (35%). Delivery date: 15/12/2023

- Interdisciplinary Physics and Geology Project (65%). Delivery date: 02/02/2024

## Assessment Activities

| Title | Weighting | Hours | ECTS | Learning Outcomes |
|---|---|---|---|---|
| Avaluació d'història de les ciències | 40% | 0 | 0 | 12, 1, 10, 4, 6 |
| Avaluació dels fonaments de Biologia | 30% | 0 | 0 | 12, 1, 10, 2, 3, 4, 5, 7, 8, 9, 11, 13 |
| Avaluació dels fonaments de Geologia | 30% | 0 | 0 | 12, 1, 10, 2, 3, 4, 5, 7, 8, 9, 11, 13 |

## Bibliography

***Bibliography***

BIBLIOGRAPHY of the History of Science

There will be specific bibliography for each session. The following references are general.

BARONA, Josep Lluís (2003). Història del pensament biològic. València: Universitat de València.

BOWLER, Peter J.; MORUS, Iwan Rhys (2007). Panorama general de la ciencia moderna. Barcelona: Crítica.

COLLINS, Harry; PINCH, Trevor (1996). El gólem. Lo que todos deberíamos saber acerca de la ciencia. Barcelona: Crítica.

FARA, Patricia (2009). Breve historia de la ciencia. Barcelona: Ariel.

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LINDBERG, David C. (2002) Los inicios de la ciencia occidental. Barcelona: Paidós.

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ORDOÑEZ, Javier; NAVARRO, Víctor; SÁNCHEZ RON, José Manuel (2003). Historia de la Ciencia. Madrid: Austral/Espasa..

PESTRE, Dominique (2008). Ciència, diners i política: assaig d'interpretació. Santa Coloma de Queralt: Obrador Edèndum.

ROSSI, Paolo (1998). El nacimiento de la ciencia moderna en Europa. Barcelona: Crítica.

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BIBLIOGRAPHY Fundamentals of Biology

YÉLAMOS María Belén; FERNÁNDEZ, María Inmaculada. 2016. *Biologia.* Ediciones Paraninfo.

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TORTORA, Gerdad; DERRICHKON, Bryan. 2008. *Introducción al cuerpo humano: fundamentos de anatomía y fisiologia* (7ª Edicion). Editorial Médica Panamericana, Mexico.

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PEDRINACI, Emilio. (2001). *Los procesos geológicos internos*. Síntesis educación. Madrid.

KELLER, Edward A.; BLODGETT, Robert H. (2007). *Riesgos naturales*. Pearson. Prentice Hall, Madrid.

CRAIG, J.R.; VAUGHAN, D.J.; SKINNER, B.J. (2006). *Recursos de la Tierra: Origen, uso e impacto ambiental*. Pearson. Prentice Hall, Madrid.

GUTIÉRREZ, Mateo. (2008). *Geomorfología*. Pearson. Prentice Hall.

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STRAHLER Arthur. y STRAHLER Alan. (1989). *Geografía física*. (3ª Ed.) Omega.

MOTTANA, Annibal.; CRESPI, Rodolfo.; LIBORIO, Giuseppe (1980): *Guía de minerales y rocas*. Ed. Grijalbo. Barcelona.

MATA, Josep M. y SANZ, Joaquim. (1988). *Guia d'identificació de minerals*. Parcir, Manresa.

Webs

Institut Cartogràfic i Geològic de Catalunya (ICGC): http://www.icgc.cat

Geocamp-portal de les activitats de camp: http://webs2002.uab.es/_c_gr_geocamp/geocamp/1024/index.ht

Terminologia: http://cit.iec.cat

Web de ciències en context: http://www.cienciesencontext.com/

Magazines

Enseñanza de las Ciències de la Tierra (AEPECT): http://www.aepect.org/larevista.htm

Alambique https://www.grao.com/revistas/revista-alambique/

Enseñanza de las Ciencias: http://www.raco.cat/index.php/ensenanza

## Software

For the resolution of the practical activities we will use:

-Google Earth

-Global Mapper

-Microsoft Excel