



**Universitat Autònoma
de Barcelona**

Biology and Geology

Code: 44328
ECTS Credits: 10

2021/2022

Degree

4310486 Teaching in Secondary Schools, Vocational Training and Language Centres

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:
Some groups entirely in Catalan:
Some groups entirely in Spanish:

Teachers

Joan Bach Plaza

Sergi Grau Torras

Ignasi Medà Calvet

Sandra Saura Mas

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).

Skills

- 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 compose 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, this part is intended that the student acquire a basic historical master scientific culture.

1. What is science? Where is the History?
2. Ways of looking cosmos
3. Individual, information and society
4. Health and disease in Early Modern History

5. Light and the universe
6. The transmutation of matter
7. Science and technological determinisms in the 20th century
8. Frankenstein or the dream of reason
9. The Two Cultures
10. Microorganisms and vaccines
11. Chaos, order and dinosaurs
12. History in science teaching

Each session will be focused on one theme and the texts proposed in the campus virtual will be presented and discussed.

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). Alterations of the genome.
- Human body: General organization of the human body. Anatomy and physiology of the devices. Endocrine sensory organs, nervous system.
- Origin of life. Biological diversity. Fixity and evolutionism. Darwinian selection. From fossil hominids to Homo Sapiens and Evolution of Man.
- Organisms and systems. Levels of ecological organization. Basic principles of ecology.

Fundamentals of Geology (3cr)

- Geology as science.
- The Sun-Earth system.
- The Earth as a complex system.
- Earth materials: minerals, rock builders and resource base.
- Earth materials: rocks, rock cycle.
- Internal structure and Earth changes: global tectonics, earthquakes, volcanoes, deformation and tectonic structures, landscape as an interaction between internal and external processes. Geohazards.

- History of the Earth: strata, sedimentary structures, sedimentary environments, stratigraphic record, continuity and discontinuity, geological time, dating and fossils.

- History of the Earth: geological maps, map elements, maps and geological sections, geological history.

- Geology of Catalonia. Geological history and landforms of relief. Field work in the area of the Sant Jaume stream between the towns of Olesa de Montserrat and Vacarisses.

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 transversal activity of "Fundamentals of Physics" and "Fundamentals of Geology", it is scheduled to be done in groups.

Methodology

Our teaching approach and assessment procedures may be altered if public health authorities impose new restrictions on public gatherings for COVID-19.

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.

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 avaluació 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			
Anàlisi de lectures i propostes d'innovació didàctica, realització d'informes, disseny d'activitats, anàlisi i resolució de casos	120	4,8	12, 10, 2, 3, 4, 5, 7, 6, 9, 11, 13

Assessment

Evaluation criteria

The class attendance is mandatory. The student must attend a minimum of **80% of the full sessions** of the module. Otherwise it will be considered "no show".

To pass the module Biology and Geology is necessary to have passed each of the blocks of content and each of the themes that shape and can still be made independently

Summative evaluation of each of the themes of each block includes group activities and individual activities. To make media should take at least 4 of each of the planned activities to be evaluated and that teachers previously indicated.

Throughout the module part of each teacher / a imparts, you can ask additional tasks without having to be necessarily considered assessment tasks, but delivery obligations.

Delivery of work is primarily done via the virtual campus. They may enable other routes of delivery, in agreement with the teachers, informed via attendance in class and via virtual.o moodle campus. No work delivered by way not agreed with the teacher / a nor work with incorrect formats, which do not include the names of the authors and subject matter to which they refer or sent after the deadline will be accepted.

Since the lingua franca of the master and secondary education is Catalan, oral and written tasks related to this module will be presented in this language. In written tasks, linguistic correction, composition skills and formal presentation aspect will be considered. Nevertheless, it is necessary to express yourself with fluency and correction in oral activities. A prominent level of comprehension of academic documents will also be required. An activity may not be assessed, not given back or failed if any of the mentioned requirements are not accomplished.

Work and examinations will be assessed at most one month after delivery or performance.

According to the regulations UAB, plagiarism or copying of any work will be penalized with a 0 rating, losing the ability to recover, whether it is an individual work and group (in this case, all group members will have a 0).

History of Science

To assess this course, students must write an essay from 1200 to 1500 words about the didactic applications of the course contents. Specific indications will be given during the course lessons. Delivery date: 19/02/2021

Fundamentals of Biology

- Specific activities for implementing the contents worked, as can be the answer to some questions from the PAU exams: 35%. Delivery date: at the end of each class

- Interdisciplinary project linked of Chemistry and Biology: 65%. Delivery date: 10/05/2022

Fundamentals of Geology

- Interpretation assignment of the field work: 35%. Delivery date: 9/01/2022

- Interdisciplinary project linked of Physics and Geology: 65%. Delivery date: 4/02/2022

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 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 ciència 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.

GIORDAN, A., coord. (1988) *Conceptos de Biología*. Madrid: Labor.

HOLTON, Gerald (1993). *Introducción a los conceptos y teorías de las ciencias físicas*. Barcelona: Reverté.

JAHN, I., LOTHER, R., SENGLAUB, K. (1990). *Historia de la biología*. Barcelona: Labor.

KUHN, Thomas S. (2006). *La estructura de las revoluciones científicas*. Trad. de Carlos Solís Santos. Madrid, México: Fondo de Cultura Económica.

KUHN, Thomas S. (2007). *L'Estructura de les revolucions científiques*. Introducció a l'obra de T. S. Kuhn per John L. Heilbron; traducció de Josep Batalla. Santa Coloma de Queralt: Obrador Edèndum.

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

OLBY, G.N. CANTOR, J.R.R. CHRISTIE, M.J.S. HODGE, eds. (1990). *Companion to the History of Modern Science*. London: Routledge.

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.

SHAPIN, Steven (2000). *La revolución científica. Una interpretación alternativa*. Barcelona: Paidós.

SOLIS, Carlos; SELLÉS, Manuel (2005) *Historia de la Ciencia*. Espasa. Madrid.

BIBLIOGRAPHY Fundamentals of Biology

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

HARARI Yuval Noah. 2016, *Sàpiens, una breu història de la humanitat*. Edicions 62

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

CHIRAS, Daniel . 2005. *Human Biology*. (9th edition). Jones and Bartlett Publishers, Boston.

BIBLIOGRAPHY Fundamentals of Geology

TARBUCK, Edward J & LUTGENS, Frederick K. (2005). *Ciencias de la Tierra*. (8ª Ed.) Pearson. Prentice Hall.

PEDRONACI, 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.

BOGG, Sam, J. (2006).- *Principles of Sedimentology and Stratigraphy*. 4th ed., Pearson-Prentice Hall.

ANGUITA, Francisco. (1988). *Origen e historia de la Tierra*. Ed. Rueda, Madrid.

POZO, Manuel.; GONZÁLEZ, Javier.; GINER, Jorge. (2004). *Geología Práctica*. Pearson. Prentice Hall.

OMS, Oriol.; VICENS, E. y OBRADOR, Antoni. (2002). *Introduccional mapa geológico (1): topografía y fundamentos*. Monografías de Enseñanza de la Ciencias de la Tierra. Serie Cuadernos didácticos nº2.

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 Ciencias de la Tierra (AEPECT): <http://www.aepect.org/larevista.htm>

Alambique

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

Software