Universitat Autònoma de Barcelona

2019/2020

Physical Environment

Code: 100838
ECTS Credits: 6

Degree	Type	Year	Semester
2500251 Environmental Biology	FB	1	2

Contact

Name: Rogelio Linares Santiago
Email: Rogelio.Linares@uab.cat

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

Olga Margalef
Mario Zarroca Hernández

Prerequisites

Although there are no official prerequisites, it is advisable for the student to review:

1) Rocks and minerals classification and identification systems.

2) Baccalaureate Earth Sciences fundamentals.

Objectives and Contextualisation

In the Degree in Environmental Biology, the Physical Environment (abiotic natural environment) is considered as an integral part of the natural-anthropogenic dynamics of the Biosphere. This systemic vision of the natural environment leads us, inevitably, to develop certain aspects of the Geological Sciences. Those that will allow us to understand how geologic (geomorphological and hydrogeological) and climatic processes act jointly and interact with biological systems.

This matter has been designed to provide future professionals of Environmental Biology with basic and fundamental knowledge about the natural dynamic of the physical environment: the scenario (static and dynamic) in which the biological processes are developed.

Intentionally, the matter goes away from those methods, work techniques and specific contents of the rough Geology, which are only useful for geology professionals. Instead, it focuses on those applied and basic aspects useful for future professionals of Environmental Biology.

The matter of the Physical Environment, has as a starting point the knowledge acquired by the students through the subject Baccalaureate's Earth and Environmental Sciences matters.

Main objectives:

To introduce the student to the knowledge of fundamentals and methodology of Geological Sciences, applied to bio-environmental problems solving.

Specifically, it is proposed to work following two strands: on the one hand, to give basic concepts about the subject related to principles and generic formulations, on the other, to concretize these formulations in examples at local and regional level.

At the same time, to introduce the students in the "real" work, promoting learning methodologies that will allow them to address their future work with a certain autonomy, and to reach a compression of the subjects at deferent levels, more or less extensive, according to the specific interests, whether it is a task of revision-supervision of works or their execution.

Finally, to attempt the student to fit Physical Environment matter within the framework of Environmental Biology, without establishing fictitious cuts between these areas of complementary knowledge. It is about the fact that he himself has a conception, to be able to apply it, according to which it relates to many other disciplines.

The matter is closely related to basic and compulsory subjects of Natural Environment Prospection (First Year) and Environmental Cartography Analysis (Second Year).

Competences

- Catalogue, assess and manage natural biological resources.
- Describe, analyse and assess the natural environment.
- Develop a sensibility towards environmental issues.
- Interpret and design the landscape.
- Participate in environmental impact assessments regarding the biological medium.
- Produce thematic cartographies of the natural environment.
- Solve problems.
- Work individually and in teams.

Learning Outcomes

1. Calculate hydric balances and climate indices.
2. Develop a sensibility towards environmental issues.
3. Employ methods and techniques of field description and sampling, and of subsequent interpretation of the principal characteristics of the physical environment that affect the biota.
4. Handle and interpret climate maps and synoptic weather charts and apply the concepts of meteorology and climatology to a region and those of microclimatology to a season.
5. Handle and interpret topographic maps, geological maps and geological profiles, and interpret the geological history of a region.
6. Handle with ease functions applied to solving basic problems in fluid and gas dynamics.
7. Localise cartography of the natural environment and georeferencing of information.
8. Recognise the principal types of rocks and minerals.
9. Recognise the principal units of the landscape of Catalonia and the Iberian peninsula.
10. Solve problems.
11. Work individually and in teams.

Content

Applied geological fundamentals

The physical environment as a support for biological processes. Fundamentals. Space and time scale in Geology. Petrogenetic cycle. Types of rocks. Deformation. Geological mapping. The geological map. The new geothematic maps of Catalonia.

Basic topics of Climatology and Meteorology.

Climate system and meteorology. Structure of the atmosphere. Radiation balance and spectral distribution. Energy flows. Temperature as a climate parameter. Adiabatic thermal gradients.

Atmospheric humidity Evapotranspiration-perspiration and its determination. Temporary distribution of water balance. Atmospheric pressure. Dynamics of the air masses, anticyclones and storms. Atmospheric general circulation, main and local winds. Stability and instability of air masses and atmospheric disturbances. Precipitation, rainfall regimens.

Climatology. Climatic stairs, drought and climate indexes. Synthetic, biogeographical and agroecological climatic classifications. Catalan climatic diversity. Climate change due to astronomical and geological causes. Anthropic climate change, evidence, potential for global warming of GHGs. Emissions scenarios and projections of the IPCC.

Hydrology

The water cycle. The concept of water balance. The balance factors. The hydrographic basin. Morphometric parameters. Surficial hydrology. River hydraulic parameter. Gauging methods. Processing and representation of data. Aquifers and geology. The water in the subsoil. Aquifers Parameters that define a geological unit as an aquifer. Geophysical exploration methods. Underground hydrology. Principles of fluid mechanics. Water energy in aquifers. The hydraulic gradient. The water flow in the saturated zone: Darcy's law. Hydraulic parameters. Representation of the underground flow: piezometer. Measures. Graphic representation. River-aquifer relationships. Hydrochemistry. Physical-chemical analysis of water and plots used in Hydrogeology. Hydrochemistry fundamentals. Geochemical evolution of waters. Quality regulations according to uses.

Geomorphological systems

External Geodynamics. Agents, processes and forms. Geomorphology: analysis and fundamentals. The time and space scales in Geomorphology. Fluvio-torrencial: Hidrosystem concept. Erosive and depositional processes. Floodplains. Alluvial fans. River terraces. Flooding. Karst: Dissolution of carbonates. Surface characteristics (Karr). Sinkholes. Poljes Karst valleys and springs. Endokarst. Type of karst and climate influence. Evaporite karst. Coastline: Sea level oscillations. Waves, currents and tides. Type of coasts. Beaches, barriers and arrows. Coastal dunes. Mud plains, salt marshes (wetlands) and mangrove swamps. Estuaries and deltas. Glacier and periglacial: The glaciers. Glacier Erosion. Erosion processes and resulting landforms. Glacier transport and sedimentation. The periglacial domain. Typical processes. Periglacial forms. Arid and semi-arid zones: Processes and wind forms. Mechanisms of meteorization. Surface forms. Slopes forms. Arid lakes and associated forms.

Field work in Geology

It integrates the knowledge on the previous issues and their application in the field.

Methodology

Methodology

In accordance with the previously defined objectives, the theoretical and practical aspects of the matter are distributed as follows:

Master classes:

Theoretical concepts will be transmitted, mainly, in the classroom through lectures, with ICT support and debates in a large group. Apart from the selected bibliography, the students will be provided with a diversified materials to follow the classes

Support material for the master classes:

Block 0. Introduction .... Selected bibliography

Block 1. Applied geological fundamentals ..... Selected bibliography

Block 2. Climatology and Meteorology ..... Selected bibliography, websites of interest

Block 3. Hydrology ....Notes from the topics

Block 4. Geomorphological systems ..... Abstracts in pdf of some Powerpoint of the selected topics and bibliography

These support materials will be available for the student in the virtual campus and in the UAB's libraries.

The theoretical concepts acquired by the students will be evaluated through written tests.

Field practices and collective work

Practical work mainly focuses on acquiring field work methodologies and skills, during field trips. The field practices will be developed on the UAB's campus and in other places in Catalonia.

In the UAB campus and in its surroundings, several existing outcrops will be studied. With these practices, students are expected to learn about the techniques of recognizing rocks and minerals in the field.

During field trips, the student must acquire a transversal and systemic knowledge of various geo-environmental problems existing in Catalonia. Each of the practices-group will attend the following field trips:

1) River Llobregat basin 1. Súria-Cardona sector

2) Llobregat River Basin 2. Baix Llobregat-Barcelona Sector

The practical knowledge acquired by the students will be evaluated through written tests (same controls programmed by the theoretical contents) and with the realization of a collective work.

Through this work, students must identify and define the role played by geographic and geological factors in certain realities of Environmental Biology. In the virtual campus, the student will get a document-guide to implement the work. During the course, the student will be guided on the methods and problems that will arise will be solved.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
In-field practices	22	0.88	7, 6, 4, 3, 8, 9, 11
Master classes	32	1.28	1, 7, 6, 4, 5, 3, 8, 9
Type: Autonomous			
Preparation of dossiers and portfolio	20	0.8	7, 6, 4, 5, 3, 8, 9, 11
Problem study and solving	70	2.8	1, 7, 6, 4, 5, 3, 8, 9, 10

Assessment

Evaluation

The evaluation will be carried out throughout all the course, partly individually and partially collectively.

1. Individual evaluation (80% of final grade):

In this part, the scientific-technical knowledge of the matter reached by the student is evaluated individually, as well as his/her analysis and synthesis, and critical reasoning skills.

The evaluation of the theoretical contents and some regarding the practical contents is carried out by means of 2 written tests that are performed (the second test does not include the contents of the first one). The qualification of this part is the sum of both written tests. Each one of these evaluation activities denote a percentage of 40% to the overall grade.

The qualification obtained in this individual evaluation will represent 80% of the matter final grade.

2. Collective evaluation (20% of the final grade):

This part evaluates the work done in groups on the geo-environmental aspects of the areas that will be visited in the Llobregat River basin.

The grade obtained in this collective evaluation is 20% of the final matter grade.

3. Non-evaluable:

It will be considered that a student will obtain the rating of Not Evaluable if the evaluation of all the evaluation activities carried out does not allow him to reach the global grade of 5, in the suppose that he/she had obtained the maximum grade in all of them.

4. Attendance at practical sessions (or field trips)

It is mandatory. Students will obtain the "Not Evaluable" grade when the absence is greater than 20% of the scheduled sessions.

5. Remedial examinations and improvement of grades:

The possibility of improving the final overall grade is just considered through a final oral test. Note that the grade obtained in this oral evaluation can negatively affect the previous grade achieved throughout the course.

To participate in the remedial evaluation, students must have been previously evaluated in a set of activities, the weight of which equals a minimum of two thirds of the total grade of the matter or module. Therefore, the students will obtain the "Not Evaluable" qualification when the evaluation activities carried out have a weight lower than 67% in the final grade.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Collective work	20	0	0	1, 7, 6, 4, 5, 3, 8, 9, 10, 2, 11
Test 1	40	3	0.12	1, 7, 6, 4, 5, 3, 8, 9, 10, 2
Test 2	40	3	0.12	1, 7, 6, 4, 5, 3, 8, 9, 10, 2

Bibliography

Bibliography
Basic bibliography
1) Geology fundamentals and field work:
• Tarbuck, E J. y Lutgens, F. K. (2005). Ciencias de la Tierra. Una introducción a la geología física (8ªedición). / Prentice Hall - Pearson educación ISBN: 9788420544007.
2) Climatology and Meteorology:

• Cuadrado, J. M. y Pita, M.F. 2006. Climatología (4ª edición). Ed. Cátedra, Madrid, 496 p. ISBN 84-376-1531-3
• Martín Vide J., Olcina J., 2001. Climas y tiempos de España. Alianza editorial, Madrid, 258p.
• Al Gore (2007) Una verdad incómoda. Ediciones 62 y Editorial Gedisa S.A. Barcelona, 328p. ISBN 978-84-9784-222-8
• Grupo Intergubernamental de Expertos sobre el Cambio Climático, www.ipcc.ch/
3) Hydrology:
• URL: http://web.usal.es/~javisan/hidro/hidro.htm
4) Geomorphological systems:
• Gutiérrez Elorza, M (2008): Geomorfología. Ed. Pearson -Prentice Hall. 898 p.
5) Practical issues:
• Pozo, M .; González Yélamos, J .: Giner, J. (2003). Geología Práctica. Introducción al Reconocimiento de Materiales y Análisis de Mapas. Prentice Hall - Pearson educación. ISBN: 84-205-3908-2.

Complementary bibliography will be provided throughout the course.

Links:
Aula Virtual de la Autónoma Interactiva https://cv2008.uab.cat