COURSE DATA

Data Subject	
Code	33070
Name	Geology
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1100 - Degree in Biology	Faculty of Biological Sciences	1	Annual

Subject-matter

Degree	Subject-matter	Character
1100 - Degree in Biology	4 - Geology	Basic Training

Coordination

Name	Department
GOZALO GUTIERREZ, RODOLFO	356 - Botany and Geology
ROS FRANCH, SONIA	356 - Botany and Geology
VALENZUELA RIOS, JOSE IGNACIO	356 - Botany and Geology

SUMMARY

The main target of this subject is to give a general knowledge of the basic concepts of Geology, its present theories (e.g. Plate Tectonics) and its interrelations with Biology. Considering that it is a Basic Formation subject, its development tries to give a general vision of the different layers of the Earth, how are the processes that affect it, and its interrelations with the atmosphere and hydrosphere; finally, a vision of current geological environments (its dynamic and modeling processes) like habitat of the different biological communities will be done. For the formation of a biologist it is necessary to know that the life is based on a physical substratum, which is in continuous evolution and, as well, the organisms act on this substratum modifying it. In addition, this process has been and it continues being a basic fact in the history of our planet, and its knowledge is unavoidable to understand the history of the life.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1100 - Degree in Biology

- Capacidad de crítica y autocrítica en la obtención, análisis y presentación de la información geológica práctica.
- Identificar objetivos y responsabilidades individuales y colectivos y actuar de forma adecuada en estos roles.
- Reconocer los puntos de vista y opiniones de otros miembros del equipo.
- Capacidad de sintetizar los datos en un informe.
- Capacidad para contrastar datos propios con otros de tipo bibliográfico.
- Capacidad para transmitir adecuadamente la información de forma escrita, verbal y gráfica, para diversos tipos de audiencia.
- Proponer, a partir de datos y observaciones propias, ideas e hipótesis de trabajo sobre los rasgos geológicos de un sector o área de trabajo.
- Adquirir los conocimientos básicos en Geología.
- Tener una visión holística de la Geología.
- Ser capaz de utilizar paradigmas, conceptos y principios básicos de la Geología aplicados sobre el terreno.
- Conocer el origen y evolución de la Tierra.
- Conocer la estructura y composición de la Tierra.
- Conocer los métodos de trabajo de campo y saber aplicarlos a casos reales.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

• Basic knowledge of scientific terminology that allows the student to become familiar with basic geological concepts. In geology, as a historical science, we need to take into account the **time** factor on a scale whch is not the normally that the biologists used to manage; this concept adequately complements the experimental aspects of other subjects.

• Knowledge of the interrelationships between Geology and Biology. Here it is intended that the student knows a set of facts that show the interdependence between many fields of both science, so as to be able to understand as comprehensive as possible the natural phenomena.

• Development of the student's skills in carrying out the techniques of Geology (rocks recognition, map reading, etc) and their possible applications to biology (eg. Use of GPS location points with UTM and geographic coordinates, etc).

• Capacity development of critical appraisal of the data, hypotheses and scientific theories, given the framework in which they work.

• Finally, the student must develop the ability to raise new problems. This should be a reflection of the aforementioned critical attitude, since it allows to observe those points that are not adequately explained with the hypothesis and existing theories, or those that need a verification.

In conclusion, it is necessary to provide students with **a knowledge of the main current geological theories, their relationship to biological theories and relationships between them**, which raises the need for a clear understanding of the concept of geological time and the scale of processes, which allows the student to obtain a more adequate perspective of the evolutive processes.

DESCRIPTION OF CONTENTS

1. Introduction to Geology

Concept. Objectives and methodology. Interrelation with the Life Sciences. Time (absolute and relative) in Geology. Principles and basic concepts in Geology.

2. Structure and internal composition of the Earth

Gravity anomalies and Isostasy. Terrestrial heat flow. Seismology. Internal structure of the Earth from the seismic and geodynamic points of view. Composition of the Crust, Mantle and Core.

3. Minerals and rocks

Properties of minerals and internal structure. The classification of minerals. The rocks. Physical properties of rocks. Plutonic, volcanic and hipoabissal rocks. Sedimentary rocks and Diagenesis. Metamorphic rocks.

4. Plate tectonics and global tectonics

Physiography of the Crust. Earths magnetic field: Paleomagnetism and seafloor spreading. Current system of Lithospheric Plates. Evolution of plate boundaries: Fracture of cratons and orogens. Wilson cycle. Hypotheses about the causes of plate motions.

5. Deformation of the Earths Crust materials

Types of deformation. Geometry and types of folds. Cartographic representation of folds. Geometry and types of faults. Fractures related to folds. Cartographic representation of faults.

6. The Earth atmosphere and climates

Origin and evolution of the Atmosphere. Composition and Structure: thermal and electrical points of view. General theory of the Atmospheric Circulation. Climate and factors of climatic control. Macroclimates: Classifications. Mesoclimate: Climate indexes.

7. Geologic environments and landforms of the continental areas

Definition and characterization. Fluvial processes and landforms, and lake areas. Underground waters. Karst landforms. Glacial processes and landforms. Aeolian processes and landforms.

8. Processes and landforms of the marine areas

Physical and chemical characteristics of the oceans. Marine dynamics: tides, waves, and surface and deep currents. The global circulation of the oceans. Coastal dynamics and landforms. Dynamics and landforms of the marine bottoms. Reefal bioconstructions.

9. Visual recognition of rocks

- The minerals and the rocks. Properties of minerals. The classification of minerals. The rocks: classification and basic concepts.
Igneous rocks: plutonic,hipoabissal and volcanic rocks.
Sedimentary rocks: clastic, intermediate, carbonate, siliceous, evaporite and organic-rich rocks
Metamorphic rocks

10. Introduction to the topographical map

Elements of the topographical map. Topographical profiles.

11. Geological map

Basic concepts of the geological map. Maps on horizontal materials. Spatial disposition of the materials. Inclined and vertical materials: rule of the V. Conformity and unconformity. Fractures: normal and inverse faults. Folding. Geological histories and analysis of complex maps.

12. Field excursion

Field excursion to Volcán de Cofrentes and Cuchillos del río Cabriel.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	31,00	100
Laboratory practices	26,00	100
Tutorials	3,00	100
Attendance at events and external activities	3,00	0
Development of group work	10,00	0
Development of individual work	5,00	0
Study and independent work	37,00	0
Preparing lectures	21,00	0
Preparation of practical classes and problem	14,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The development of the subject must be structured in one or two theoretical classes a week. Before each of these sessions the students will have acceded to the thematic units developed by the professor together with a basic bibliography about each unit. In the classes, the more complex and theoretical aspects of each topic will be explained and the pertinent examples will be exposed; like a previous requirement to each session, the students must read the corresponding aspects that will be developed.

For the laboratory sessions (2 hours of duration) the students also have a script of practices that they must read before each practice. In some cases, mainly in the practices concerning geological maps, complementary exercises will be proposed to realize during the week in order to reinforce the analyzed concepts. Within the first thirty minutes of each session, the professor can comment the aim of the practice, he also can solve the exercises that were proposed as reinforcement explaining later the basic concepts corresponding to the session; the rest of the time will be dedicated by the students to realize the practice under the supervision of the professor. The aim of the field excursion, that is included within the scope of geology practices, is to allow the students the direct observation -in a natural context- of different kinds of rocks and geological structures that they have been learned to recognize in the laboratory, what can help them to interpret the processes and geological history of the visited area. The excursion will be organized on two areas of geological interest: the *Volcán de Cofrentes* and the *Cuchillos del río Cabriel* and, in the final exam, students must give a questionnaire at the end of the fieldwork. This questionnaire would test the acquired knowledge and the developed competences.

On the other hand, the professor will provide to the students an attention schedule that they may use if necessary. Within this schedule it is stipulated the attendance of each student, of individual way, at least three times during the fourth month period to monitored his learning.

In addition, there will be guided activities such as seminars, scientific documentaries, use of geological software, visit to the Museum of Geology at the University of Valencia and the sample preparation laboratories, etc.

Finally, interdisciplinary workshops will be held: This is a common transverse activity to all subjects of the course. Also under the heading of Seminars, the attendance to different conferences cycles offered by the Faculty of Biological Sciences is took into account.

For the seminars, 3 sessions of 2 hours each are proposed for this activity. 3 Interdisciplinary Seminars are planned, 2 of them in groups. Lecturers of these subjects would be involved mainly in the tutoring and presentation of their content. The result of these seminars is planned to be in the form of:

ELABORATION OF A POSTER that will be publicly exposed in the Days of Valuation at the end of the course, where they must be defended it in front of several lecturers and students, and they will also participate as a judge of other posters. To the qualification of this work it will also take into account the reports, in accordance with the norms of the interdisciplinary works and the various meetings that the group have had with the tutor assigned to each work, and also the presentation and defense of the poster the day of valuation.

The evaluation will be carried out by the entire group of lecturers; it will cover both the scientific content covered, and how they have been presented, especially valuing the ability to communicate and transmit ideas and concepts.

Alternatively to this activity, it may carry out any other transversal activity, supported by the CAT as part of a project of educational innovation.

EVALUATION

The evaluation of learning of knowledge and abilities obtained by the students will become a continuous task during the course. A subjective evaluation of students will be considered by the teacher taking into account his direct observations throughout classes dedicated to the resolution of questions and throughout the time dedicated to the individual attendance of each student. This subjective evaluation will be combined with an objective evaluation obtained from the results of questionnaires of the seminaries realized by the students and from the results of the subject exams.

The **theory** exam accounts for 60% of the total course. Monitoring in **theory** and **tutorials** will take place through the evaluation of the problems given in the tutorials and theoretical questionnaires by Virtual Classroom, two partial exams that are eliminatory if the mark obtained are 5 or higher on both and a final exam on the date proposed by the Faculty.

Practices accounts for 30% of the total course. In **practical** classes, students must prepare their lab notebooks and resolve the proposed maps; this work will be reviewed by the professor during practice, and a qualitative value is given. There will also be two controls on the skills acquired during practice, a recognition of rocks (9%) and another with the use and interpretation of geological maps, which will include questions on topography (18%). The fieldwork questionnaire represents the 3% of total mark. All

lab sessions are mandatory and the corresponding control tests cannot be made until these sessions have been attended.

The **seminar**, as a part of the interdisciplinary activities shared by subjects of the fourth month period, will contribute a 10% to the final mark of this subject. On the one hand, the scientific content of the work will be evaluated, and the other the ability to expose in public and discuss with colleagues the various aspects about it. In this regard, we also will evaluate the student's ability, as an audience, to do a reasoned critique of the work presented by other students.

Directed activities, volunteer work, class work, attendance at the field trip will be evaluated by the teacher. It will count up to 5% extra to add in the final mark, as long as the course set has been passed.

Summary table:

Topic to evaluate	*% of final mark*
Exams and theory questionnaires	60
Interdisciplinar seminary	10
Practical controls and field trip	30
Guided activities, volunteer work, tutoring, etc.	5 (extra, once approved course)

Finally, to pass the course, the student must have obtained at least a mark of 5 in each of the three sections.

In the case of repeaters, if the previous year they had passed a part of the course (theory, practice or seminars) the mark of these parts are kept for a year, but they will have to take exams or do the work corresponding to the part that they did not pass the previous year. In requesting an earlier examination, students must have accomplished the compulsory activities, which are set in the teaching guide.

REFERENCES

Basic

- Agueda, J. et al. 1983. Geología. Ed. Rueda.

- Anguita, F. 1988. Origen e historia de la Tierra. Ed. Rueda.
- Anguita, F. y Moreno, F. 1991. Procesos geológicos internos. Ed. Rueda.
- Anguita, F. y Moreno, F. 1993. Procesos geológicos externos y Geología Ambiental. Ed. Rueda.
- Monroe, J. S., Wicander, R. & Pozo, M. 2008. Geología. Dinámica y evolución de la Tierra. 4ª edición. Ed. Paraninfo-CENCAGE Learning.
- Pozo Rodríguez, M., González Yélamos, J. & Giner Robles, J. 2004. Geología Práctica. Introducción al Reconocimiento de Materiales y Análisis de Mapas. Ed. Pearson-Prentice Hall.
- Strahler, A.N. (1987): Geología Física. Ed. Omega.
- Strahler, A.N. y Strahler, A.H. (1989): Geografía Física. Ed. Omega.
- Tarbuck, E. J. y Lutgens, F. K. (2005): Ciencias de la Tierra. Una introducción a la geología física. 8ª edición. Ed. Pearson-Prentice Hall.

Additional

- Auboin, J. et al. 1981. Tratado de Geología. I. Petrología. Ed. Omega.
- Bastida, F. 2005. Geología. Una visión moderna de las Ciencias de La Tierra. Ed. Trea.
- Garrison, T. 2006. Oceanography: An Invitation to Marine Science. 6th edition. Brooks/Cole, Thomson Learning Inc.
- Guerra Merchán, A. 1994. Mapas y cortes geológicos. CEP de Málaga.
- Gutiérrez Elorza, M. 2008. Geomorfología. Ed. Pearson-Prentice Hall.
- Hurbut, C.S. & Klein, C. 1996. Manual de Mineralogía de Dana. Ed. Reverté.
- Khan, M. A. 1980. Geología global. Ed. Paraninfo.
- Lluch, R.R. y Martínez-Torres, L.M. 1993. Introducción a la cartografía geológica. Servicio Ed. Univ. Pais Vasco.
- Pérez Cueva, A. J. (Coord.) 1994. Atlas Climático de la Comunidad Valenciana (1961-1990). Generalitat Valenciana. Conselleria d'Obres Públiques, Urbanisme i Transports. Serie: Publicacions de Divulgació Tècnica. Col.lecció: Territori, 4.
- Rogers, N. (ed.) 2007. Our Dynamic Planet. Cambridge University Press.
- Stanley, S. M. 2009. Earth System History. W. H. Freeman and Company.
- Vera, J. A. 1994. Estratigrafía. Ed. Rueda.
- Vera, J. A. (ed. principal) 2004. Geología de España. Sociedad Geológica de España - Instituto Geológico y Minero de España.