

## 26401 - Biology

### Información del Plan Docente

<b>Academic Year</b>	2017/18
<b>Faculty / School</b>	100 - Facultad de Ciencias
<b>Degree</b>	296 - Degree in Geology
<b>ECTS</b>	6.0
<b>Year</b>	1
<b>Semester</b>	First semester
<b>Subject Type</b>	Basic Education
<b>Module</b>	---

### **1.General information**

#### **1.1.Introduction**

This subject aims that students understand and assimilate the basic principles of Biology and use them as a fundamental tool in studying the fossil record and in reconstructing how were the living beings and ecosystems of the geological past. It also helps to conceive the biosphere as a geological agent that has influenced very significantly on the geochemical cycles, climates and sediment types generated during the last 3500 million years.

#### **1.2.Recommendations to take this course**

This subject aims to unify the knowledge of students of Degree in Geology on the contents, methods and techniques more common in biology. It is designed by selecting those aspects of greatest interest to a student of Geology, with direct access to the subjects of Paleontology application.

For these reasons, it is recommended that students attend and actively participate in the classes of theory and practice, as well as maximize the teamwork and regularly attend the different types of designed tutorials. Due to the high theoretical charge of this subject, a constant effort by students is necessary, especially when completing the basic reference material that the lecturers/professors provide on the Internet.

#### **1.3.Context and importance of this course in the degree**

The subject is part of Module "Basis for Geology" dedicated to the student is able to understand and apply the concepts, principles, laws, models and theories from different basic scientific disciplines to Geology. In addition to Biology, this module is composed of the following subjects: Chemistry, Physics, Mathematics, and Computer and statistical treatment of geological data, and Fundamentals of Geology and Cartography. Although comprise up to the 1st semester of the 2nd year, it must be mentioned that the module is developed mainly during the 1st semester of the 1st year. It represents the basis for the student to face the remaining subjects and modules that make up the Degree in Geology.

#### **1.4.Activities and key dates**

- Start and end of classes: according to academic calendar established by the Faculty of Sciences and published on the website of the Faculty.

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- Schedules of theoretical and practical classes: according to schedule established by the Faculty of Sciences and published on the website of the Faculty.

- Examination Dates: according to schedule established by the Faculty of Sciences and published on the website of the Faculty.

### 2.Learning goals

#### 2.1.Learning goals

The student, for passing this subject, must show the following results:

1. Able to explain and link clearly fundamental concepts, models and theories of Biology.
2. Able to analyze and synthesize information on issues related to the structure and functioning of the Biosphere, and to present and defend in public presentations of works.
3. Able to recognize, describe and analyze the biological forms and designs, the adaptations, morphological variability of populations, the structure and biodiversity of communities and ecosystems, and the major microbiological, botanical and zoological groups, as well as identify aims and methods for the design and development of activities in natural and environmental sciences.

#### 2.2.Importance of learning goals

The ability to understand and assimilate the fundamental principles of Biology is a core competency for any geologist. The biosphere has changed dramatically over geologic time the composition of the rest of surface layers of our planet (lithosphere, atmosphere and hydrosphere), which are themselves the subject of study of Geology or of Earth Sciences in general. Therefore, it is essential for a geologist to understand how living things have influenced external geological processes and contributed to generate various types of minerals and sedimentary rocks (object of study of an emerging discipline: Geobiology).

In addition, Geology includes an intermediate discipline between Geology and Biology: Paleontology, which studies the living beings and biosphere of the geological past through fossils. Paleontology and Biology share many principles, concepts and methods.

A key part of the work of a professional paleontologist requires understanding and assimilation of basic concepts and theories of Biology, and knowledge of biodiversity.

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Equally important is the fact that, to carry out environmental studies, a geologist must acquire basic language that allows you to communicate with professionals in biology (botanists, zoologists, microbiologists, ecologists, ...), with whom will share experiences professionals in this field.

The subject will also enable students to acquire competences to design and develop programs of activities in secondary education related to Natural and Environmental Sciences.

### 3.Aims of the course and competences

#### 3.1.Aims of the course

The subject aims to understand and assimilate the concepts, theories and models most important and general biology, mainly on Ontogeny, Developmental biology, Biomorphology, Ecology and Evolution, as well as recognize the biodiversity (Botany and Zoology), in order that students have an overview of the biotic environment and a basic biological training to enable them to apply this knowledge to the theoretical and practical problems of Paleontology and Geology.

#### 3.2.Competences

**When pass the subject, students will be more competent to ...**

1. Understand and apply concepts, principles and basic methods of Biology.
2. Understand the factors that influence the shape and morphological evolution of living beings.
3. Identify biological forms and designs, and apply basic principles in the morphological characterization of an organism and functional morphology to identify adaptations in living beings.

### 4.Assessment (1st and 2nd call)

#### 4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

**The student must demonstrate that it has achieved the intended learning outcomes through the following evaluation activities:**

1. Written test on basic knowledge of Biology.

It will be based on the program of learning activities, and will be divided into two blocks: I - Basics of Biology, and II - Biodiversity, which will have some degree of independence.

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Development of memory, and public presentation and defense of a practical work on a topic related to the structure and functioning of the biosphere (Geobiology, Descriptive Ecology and Biogeography).

2. Development of report, and public presentation and defense of a practical work on a topic related to the structure and functioning of the biosphere (Geobiology, Descriptive Ecology and Biogeography).

The report will be done in groups of 2 or 3 students. This report should be produced following the guidelines and format marked off in the subject syllabus at the beginning of the course.

The work will be presented and defended by each group of students in type-seminar sessions, in which all authors must intervene to explain and argue some of the points contained in the report, and discuss with other participants (professors and students) in the seminars. The time available for the presentation and defense of the topic during the seminar sessions will be 15 to 20 minutes.

3. Continuous development of a notebook of laboratory practice on different exercises of visu, biometry, microscopy and dissection. The exercises consist of recognizing shapes, patterns, designs and biological adaptations; performing analyses on biometrics, morphological variability and diversity indices; identification of microbiological, botanical and zoological groups, and observation of their anatomical parts.

Attendance at laboratory practices will be mandatory.

The exercises are individual and the student must submit a report at the end of each session, following the guidelines and format that will be marked the beginning of each session. The scores will be available to students at the beginning of the following practice session, and review requests will be addressed in the tutoring schedule of the professor responsible for that session.

This type of controls falls within the concept of continuous assessment, which will track the learning process.

Students may optionally have the possibility to perform a practice examination in the first call, framed within the overall assessment test to which they are entitled.

It will consist of practical exercises of visu, biometry, microscopy and dissection, and the qualification criteria will be the same as for students who have delivered the notebook of laboratory practice.

### **Evaluation and Qualification Criteria**

**The assessment or rating of the different activities of evaluation will be conducted using the following criteria and assessment levels:**

**1. Rating of the written test on basic knowledge of Biology.** This test is assessed taking into account the following criteria: adequacy between question and answer, ability of synthesis, definition and analysis, and clarity and order of the reasoned responses. The rating of this test represents 60% of the final grade and will be assessed on a total of 6 points.

**2. Assessment of report, and the presentation and defense of the practical work on a topic related to the structure and functioning of the Biosphere-Ecosphere.** This test is assessed taking into account the following criteria: clarity and order of the written report, ability to teamwork, ability to properly transmit information during the exposition, and ability to discuss during the defense of the topic chosen. The rating of this test represents 20% of the final grade and will be assessed on a total of 2 points.

**3. Assessment of exercises of laboratory practice .** The notebook of laboratory practice will be assessed taking into account the following criteria: attendance and participation in practical sessions, adequacy between the proposed exercises and delivered reports, and presentation quality lab notebook. The rating of the lab notebook represents 20% of the final grade and will be assessed on a total of 2 points.

To overcome this subject, obtaining at least 3 points (out of 6) in the written exam of basic knowledge of Biology is considered indispensable. Activities 2 and 3 are considered mandatory to pass the course and both must be approved with at least one of the two possible points.

The approved activities are released in the subsequent calls of the academic year to which the student is entitled.

## **5.Methodology, learning tasks, syllabus and resources**

### **5.1.Methodological overview**

The subject has a basic character, so that the proposed activities are focused on understanding and assimilation of the main foundations of Biology and knowledge of Biodiversity and Biosphere, basis for future professionals of Geology.

For this reason, the overview of the knowledge acquired in lectures of participatory character, is complemented by practical activity in laboratory and desk study, where students shall demonstrate the used methods/analysis and the knowledge of their application. In addition, a seminar is proposed, in which the student must demonstrate the ability of teamwork, and expound and defend the report on issues related to the Biosphere.

exponer y defender el informe elaborado sobre temas relacionados con la Biosfera.

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For better monitoring of the learning process will be encouraged students to use the tutorials through various systems and methods: conventional tutorials, more specific tutorials related to the practical work of seminar-type, and telematic tutorials.

In support there is a Moodle course on this subject ( <http://moodle.unizar.es/> ), with basic reference material as the subject program, summaries of the theoretical issues, scripts of practices, or supplementary material.

### 5.2.Learning tasks

1. Participatory Lectures: 30 contact hours.
2. Development of a practical work of seminar-type on issues of Ecology: 12 hours, including non-contact hours (realization of practical work), and an hour and a half dedicated to specific tutorials for this activity.
3. Laboratory practices: 25 contact hours, which must include the session dedicated to the presentation and defense of the seminar, and will take place in practice schedule.
4. Study of theoretical knowledge for the written test: 78 non-contact hours (autonomous student work).
5. Overcoming of written test (completion of the exam): 5 contact hours.

### 5.3.Syllabus

The THEORETICAL PROGRAM is divided into two modules: I. Fundamentals of Biology (with three submodules), and II. Biodiversity (with two submodules), and a total of 30 themes:

#### I. Fundamentals of Biology

**Basic biology:** 1. Earth: the living planet; 2. Levels of organization; 3. Genetics; 4. Reproduction; 5. Development; 6. Biomorphology.

**Ecology:** 7. Ecology and Physical Environment; 8. Population Ecology; 9. Community Ecology; 10. Structure and Dynamics of Ecosystems.

**Evolution:** 11. Evidence and Theory of Evolution; 12. Determinant factors of evolution; 13. Natural Selection; 14. Speciation.

#### II. Biodiversity

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**Botany:** 15. Prokaryotes; 16. Fungi and Algae; 17. Mosses; 18. Ferns; 19. Gymnosperms; 20. Angiosperms.

**Zoology:** 21. Protozoa; 22. Metazoans; 23. Diversity of Metazoans; 24. Cnidaria; 25. Platyhelminths and Nematodes; 26. Mollusca; 27. Annelids; 28. Arthropods; 29. Echinoderms; 30. Chordate

The PRACTICAL PROGRAM is divided into the following lab practices: 1. Descriptive morphology and composition (biominerals); 2. Quantitative descriptive Morphology I (biometric analysis, allometry during ontogeny); 3. Quantitative descriptive Morphology II (population, discrimination and morphological variability of species); 4. Biological structure of the community (biodiversity); 5. Using the microscope and observation of prokaryotes; 6. Morphology of leaves; 7. Morphology of flowers and angiosperms; 8. Dissection of a bivalve (mussels); 9. Dissection of a decapod crustacean; 10. Dissection of a fish (trout).

### 5.4.Course planning and calendar

The course will consist of 30 classes theoretical (about one theme per class) and 12 practices (of 2 hours each). The practical work (for the seminar) and teacher responsible for their care will be allocated in the first practice session. Co-authors of each work will have three tutorials (of half-hour each) specific for the seminar, in which the tutor will guide them and will monitor their progress. The start time and duration of theoretical exam of each call of exams will be placed one week in advance on the bulletin board of the Palaeontology Area. Each call will include a practical examination for students who have not passed these tests during the semester.

- The lectures will be held on Tuesday and Wednesday from 11:00 to 12:00 throughout the academic year, and the 4 first Wednesday from 13:00 to 14:00.
- The practical sessions will be held every Monday throughout the academic year, except the first, and three practice groups will be organized: group I) from 12:00 to 14:00; group II) from 16:00 to 18:00; and group III) from 18:00 to 20:00.
- The tutorials will be held on Fridays from 9:00 to 13:00 and 16:00 to 18:00.
- The date of the presentation and public defense of the seminar will take place in one of the practice sessions, expected in late November.

Exam dates will be approved by the Faculty of Sciences.

### 5.5.Bibliography and recommended resources

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