26412 - Continental Palaeontology

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	296 - Degree in Geology
ECTS	6.0
Course	2
Period	Second semester
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

Continental Palaeontology deals with the evolution of life and ecosystems on the continents. This course is intended for students to gain a thorough grounding in the fundamentals of palaeontology, and then widen their studies to focus on fossils from continental environments (terrestrial and aquatic). Through a combination of lectures, labs, and field observations, we will address topics ranging from fossil preservation to long-term evolution of Life. The course program is designed to enable students to acquire training on the use of fossils in the dating and the environmental reconstruction of continental basins.

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Applying the fundamental palaeontology to the continental rocks, students will learn to read the long-term evolution of Life in the continental realms. This encompasses many different geological phenomena, but understanding them, it requires students to constantly think in four dimensions, on time and length scales. Students will gain hands-on experience with rocks, fossils, and field observations, as well as knowledge and skills to assess and apply solutions in their chosen scientific career.

5.2.Learning activities

This course consists of two 50-minute lectures, and one 2-hours lab session per week. One seminar session and one all-day field trip are also scheduled in this course.

Activity 1: Lectures(2.5 ECTS). To develop the concepts and theoretical basis of the course. The course covers a general view on taphonomy, vertebrate morphology and phylogeny, plant taxonomy and evolution, palaeoecological, palaeobiogeographical and palaeoclimatological analyses, as well as an overview of the development of life on continents. The course program is designed to enable students to deal with the use of fossils in the dating and the environmental reconstruction of continental basins.

Activity 2: Seminar(1 ECTS). One seminar session on one of the subjects covered during the lectures. Each student should come to seminar well prepared, having done extensive reading on a topic (from the seminar reading list proposed by the teachers), and creating a PowerPoint file supervised by the teachers that must be used in the presentation and defense of this topic. All students are expected to participate actively and often in the seminar discussions (10 hours, attendance required)

Activity 3: Lab sessions(2.1 ECTS). To apply various laboratory work techniques for the preparation and study of plant, invertebrate and vertebrate fossils and for the palaeoecological inference and paleoenvironmental environmental reconstruction of continental basins.

Activity 4: Fieldwork (0.4 ECTS). One all-day field trip to know three outcrops of continental formations (Palaeozoic, Mesozoic and Cainozoic) of the Iberian Range and to address fields observations ranging from fossil preservation and classification, vertebrate ichnology, paleoenvironmental reconstruction, strata dating, and long-term evolution of Life. All students are expected to collect field paleontological data and to fill a questionnaire or report on each outcrop that should be given at the end of the trip.

Through the course, diverse bibliography and online resources written in English will be used during the lectures and the lab sessions. These activities are considered as 1 ECTS in English for the students.

5.3.Program

The theoretical contents are divided in seven modules:

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1. Life on continental environments (terrestrial and aquatic) and its fossil record.
2. Depositional environments and modes of fossil preservation on continents. Biostratinomic and fossildiagenetic processes affecting vertebrate and plant remains.
3. Invertebrates of interest in continental sediments. Vertebrate morphology (structure and development of bones and teeth) and phylogeny. Dietary adaptations. Locomotion and postcranial adaptations. Vertebrate palaeoichnology.
4. Plants of interest in continental sediments. Plant taxonomy and evolution. Palaeoecological characterization of extinct plants.
5. Community and biome reconstructions. Responses of vegetation and mammal communities to climate and palaeogeographical changes.
6. Uses of paleontological data in dating continental rocks. Regional mammal biostratigraphic zonation and biochronological schemes.
7. Evolution of life and ecosystems on continents. Main bioevents, factors driving diversity changes and extinction. Coevolution of plants and animals.

Practical sessions on the topics covered during the lectures. The contents are divided in four modules:

1. Invertebrate and vertebrates fossils from continental environments:

- Overview of the fossils from continental environments and their main techniques of preparation and conservation (visit to the laboratory).
- Depositional environments (terrestrial and aquatic) and modes of fossil preservation on continents. Taphonomic processes.
- Introduction to the vertebrate skeleton. Endoskeleton and dermoskeleton. Cranial and postcranial skeleton. Structure and bones of the mammalian postcranial skeleton. Mammalian locomotion and postcranial adaptations.
- Skull and teeth. Structure and openings of the skull. Cranial appendages. Structure, attachment types, and eruption of teeth. Mammalian molar morphology and dietary adaptations.

2. Plant taxonomy and palaeoecological characterization:

- Propteridophytes, bryophytes and other groups of "plants"
- Pteridophytes
- Gymnosperms
- Angiosperms

3. Community and biome reconstructions. Detecting the response of the mammalian paleocommunities to environmental changes.

4. Palaeogeographical and climate reconstructions. Responses of vegetation and mammal communities to global changes. Calculating diversity curves using palaeontological databases.

5.4.Planning and scheduling

- Total Number of Hours of Student Work: 150
- Hours of Lectures: 25
- Hours of Practical lab Classes: 21
- Hours of Practical Seminar session: 10 (tutorial included)

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- Days of Fieldwork: 1

Timetable:

- The lectures will be on Wednesdays and Thursdays from 10:00 to 11:00 through the learning weeks of the 2 nd semester (except the days for field trip in the 2 nd course timetable).

- The 2-hours lab sessions will be on Thursdays from 15:00 to 17:00 through the learning weeks of the 2 nd semester(except the days for field trips in the 2 nd course timetable). There will be two groups: Group I) from 15:00 to 17:00, Group II) from 17:00 to 19:00.

- The one-day field trip: according the 2 nd course fieldwork timetable.

- The seminar session: The students should book at least 3 tutorials which will be private one-to-one (unless they specifically request a group tutorial) meeting with one of the teachers to ask any questions they have about the subject. The oral presentation of the theme will be done at the seminar according with the 2 nd course exam timetable in the academic calendar of the Faculty.

- The final exam will be done according to the 2 nd course exam timetable in the academic calendar of the Faculty. The times of the start of the exam will be announced one week before the exam. Each exam will include a practical test for those students who did not success on these parts during the term. Assessment details:

- Theoretical examination: 50% (to assessment the course, a qualification is required of at least 5 in 10-scale grading system)
- Coursework: 50% (Practical session reports, 20%; Seminar, 20%, field trip report 10%)

5.5.Bibliography and recomended resources

Course materials will consist of class notes, lecture notes (pdf files of lecture slides will be provided) and handouts of the lab sessions.

Up-to-date bibilography and recommended readings for the course can be accessed through the website ot the university library (http://biblioteca.unizar.es/).