

Degree programme	Type	Course
Geology	OB	4

Contact lecturer

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Group languages

You can consult this information at the [end](#) of the document.

Prerequisites

The course involves fieldwork consisting on one side of detailed outcrop analysis and on the other of integration of observations in a broader geodynamic context. For this it will become necessary to have previous advanced knowledge of Stratigraphy and Sedimentology, Structural Geology, and geological mapping.

Objectives

The aim of the course is the integrated study of an Alpine mountain belt such as the Pyrenees. Showing a moderate degree of deformation and exhumation, the Pyrenees can be considered as a school of geology about upper crustal structure and tectonics-sedimentation relationships.

The outcrop conditions of the Pyrenees make them the subject of numerous works, which yield ample information on structural and sedimentary geology, basin analysis, and landscape evolution. They are the subject of numerous field courses addressed to companies devoted to the exploration of natural resources, notable hydrocarbons.

To achieve the integrated study pretended in the course, we will carry out a transect perpendicular to the main structural belts, where we will analyze the tectonic and sedimentary evolution of the range from the internal to the external zones, as well as a longitudinal profile to the South Pyrenean foreland basin, where we will analyze the facies evolution from the proximal fluvial and deltaic systems to the deep sea fan turbiditic systems. This work aims to integrate concepts from different disciplines at different scales, with the objective to get a regional understanding of a major geological unit from diverse points of view.

Learning outcomes

- CM27 (Participate in field activities respecting the principles of equality and non-discrimination on the grounds of gender, origin or cultural or religious identity.) Participate in field activities respecting the principles of equality and non-discrimination on the grounds of gender, origin or cultural or religious identity.
- CM28 (Participate in the organisation of the fieldwork necessary to address a basic or applied geology problem, within the framework of a planned research.) Participate in the organisation of the fieldwork necessary to address a basic or applied geology problem, within the framework of a planned research.
- KM37 (Interpret the physical conditions in which minerals and rocks have been formed based on field criteria.) Interpret the physical conditions in which minerals and rocks have been formed based on field criteria.
- KM38 (Identify the techniques used by the different disciplines of geology in fieldwork and sample collection.) Identify the techniques used by the different disciplines of geology in fieldwork and sample collection.
- KM39 (Differentiate 'in situ' the geological materials that emerge in an area or territory.) Differentiate 'in situ' the geological materials that emerge in an area or territory.
- SM33 (Apply the basic principles of geology to reconstruct the natural history of a region of high geological interest.) Apply the basic principles of geology to reconstruct the natural history of a region of high geological interest.
- SM34 (Use the necessary instruments to efficiently carry out a geological field study.) Use the necessary instruments to efficiently carry out a geological field study.
- SM35 (Demonstrate the ability to work in a team in a field study, distributing the tasks necessary to carry it out.) Demonstrate the ability to work in a team in a field study, distributing the tasks necessary to carry it out.

Contents

Theory

Structure and evolution of an Alpine mountain belt: the case of the Pyrenees

Facies distribution and evolution of the South Pyrenean foreland basin (from platform to deep sea environments)

Tectonics-sedimentation relationships in the foreland basins

Concepts and models applicable to hydrocarbon exploration

Seminar on biostratigraphy and paleontology of the southern Pyrenees

Seminar on geologic resources of economic value in the Pyrenees

Fieldwork

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Study of a N-S structural and sedimentary transect of the southern Pyrenees (western Axial Zone-Jaca basin-External Sierras)

- Study of an E-W longitudinal profile of the South Pyrenean foreland basin (Aínsa basin to Jaca basin).

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Processing field data	30	1.2	
Theory sessions	4	0.16	
Elaboration of previous report	20	0.8	
Directed fieldwork	42	1.68	
Bibliographic study, use of virtual campus	31	1.24	
Seminars	8	0.32	

This course consists of a theoretical part in which the fundamental features of the tectonics and sedimentary geology of the Pyrenees mountain range and its southern foreland basin will be explained. This activity will serve as preparation for the fieldwork, and will contain an introduction to the necessary bibliography as well as the guidelines for the student to complete the learning autonomously. Students will have a part of the bibliographic material (scientific papers), maps and diagrams, and subsoil data, in the virtual campus, to be worked autonomously.

In addition, seminars will be held on aspects such as biostratigraphy and paleontology, or geological resources of economic interest.

Before the field camp, students must autonomously carry out a previous original report, which sets out the geological characteristics of the area to be visited, based on the essential bibliography and the information obtained from the theory classes and seminars, as well as the objectives of the field camp.

The field camp will last 6 days, in which outcrops and structural-sedimentological transects of the southern Pyrenees will be studied at the outcrop scale and at the orogen-basin scale. The fieldwork will include specific tasks that can be evaluated directly in the field (mapping, stratigraphic columns, etc.). It will be necessary to elaborate a field notebook where the observations and work done each day will be represented, which can also be reviewed and evaluated.

Annotation: 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.

Assessment

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Previous report before the field camp	15%	10	0.4	CM28, SM33
Attitude during fieldwork, field notebook and final poster	30%	0	0	CM27, CM28, KM37, KM38, SM35
Seminar evaluation	10%	2	0.08	KM37, SM33
Structural and stratigraphic field exercises	45%	3	0.12	CM27, CM28, KM37, KM38, KM39, SM33, SM34, SM35

The evaluation of the course will be based on several criteria, both referring to fieldwork and to activities to be performed outside the field.

Seminars will be subject to specific tests or assessment work. On the other hand, the previous report will be evaluated prior to departure to the field camp.

During fieldwork, the attitude and interest shown is an important component. In addition, it is also essential to carry out the observations and analyses on a regular basis and with a method, which conforms the field notebook. All this can be evaluated.

During the field camp, specific tasks will be performed that will be delivered and evaluated separately, such as geological maps and corresponding cross-sections, or stratigraphic columns and correlation panels.

After the field camp, the overall results of the work must be presented in a final report or poster that will be evaluated accordingly.

Since the course is based on fieldwork, attendance at the start is mandatory. In case of no attendance, the student will be considered as "not presented".

For a student to be evaluated, he must attend all theory sessions and seminars. The absences should be properly justified and documented. The non-delivery of any of the additional documents to fieldwork (previous report, exercises required and report / final poster) implies the failure to pass the course.

Students who have attended fieldwork but have not satisfactorily completed and failed the course, in the following year will have the option to repeat the fieldwork in the same area autonomously, and must deliver the corresponding field exercises, with demonstration of it fieldwork, and the final poster or report. The approval of these exercises will exempt from the repetition of the field camp.

These procedures may vary if the sanitary state impacts the normal development of the course. In any case, these changes would be notified in advance.

Bibliography

Book chapters (Pyrenees):

Gibbons, W. i Moreno, T. (eds.). 2002. The Geology of Spain. The Geological Society, London, 649 p.

Vera, J.A. (ed.). 2004. Geología de España. Mem. SGE-IGME, Madrid, 890 p.

Papers:

Nijman, W.J. i Nio, S.D. 1975. The Eocene Montañana delta (Trempe-Graus Basin, Southern Pyrenees). In: Rosell, J. & Puigdefàbregas, C. (eds) Sedimentary evolution of the Paleogene South Pyrenean Basin, Excursion Guidebook 19, IXth International Sedimentology Congress, Nice, 56 p.

Teixell, A. 1996. The Ansó transect of the southern Pyrenees: basement and cover thrust geometries. Journal of the Geological Society of London, 153: 301-310.

Puigdefàbregas, C., Muñoz, J.A. i Vergés, J. 1992. Thrusting and foreland basin evolution in the Southern Pyrenees. In: K.R. McClay, (ed.). Thrust Tectonics. Chapman & Hall, London, p. 247-254.

Software

Google Earth and smartphone/tablet applications for field work as Field Move

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	1	Catalan	second semester	morning-mixed
(SEM) Seminars	1	Catalan	second semester	morning-mixed
(PCAM) Field practices	1	Catalan	second semester	morning-mixed
(PCAM) Field practices	2	Catalan	second semester	morning-mixed