

Geology of the Iberian Massif Field Work

Code: 101029
ECTS Credits: 6

Degree	Type	Year	Semester
2500254 Geology	OB	3	2

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Teachers

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Marc Furio Bruno

Prerequisites

Since it is a subject that involves the observation of different types of rocks and structures in the field and its analysis in a broad geodynamic context, it is necessary that the student be able to:

- recognize the different types of sedimentary rocks and their significance
- recognize metamorphic and plutonic rocks and relate them to structural and petrogenetic processes,
- recognize and interpret geological structures and perform data collection
- interpret geological maps.

Therefore, it is recommended that the student has approved the subjects of the second year and has completed (or is taking) the other compulsory subjects of the third year.

Objectives and Contextualisation

The goal is the study, on the field, of the geology of the Variscan Iberian Massif, observing the different lithologies and structural styles, and deducing the tectonic and petrological processes that took place during the orogeny. To this end, an E-W cross-section will be made along the NW of the Iberian Peninsula, from the external to the internal parts of the orogen. This geotraverse is one of the most complete examples of an orogen and constitutes a model of international interest.

Competences

- Display understanding of the size of the space and time dimensions of Earth processes, on different scales.
- Draw up and interpret geological maps and other means of depicting geological information (columns, correlation frames, geological cross-sections, etc.)
- Identify and characterise minerals and rocks through instrumental techniques, determine their formation environments and know their industrial applications.
- Learn and apply the knowledge acquired, and use it to solve problems.
- Obtain information from texts written in other languages.
- Process, interpret and present field data using qualitative and quantitative techniques, and suitable computer programmes.
- Recognise, depict and reconstruct tectonic structures and the processes that generate them and relate types of rocks and structures to geodynamic environments.
- Show initiative and adapt to problems and new situations.
- Suitably transmit information, verbally, graphically and in writing, using modern information and communication technologies.
- Synthesise and analyse information critically.
- Work in different environments and localisations, with respect for diversity and multiculturalism.
- Work in teams, developing the social skills needed for this.

Learning Outcomes

1. Analyse tectonic structures in the field from a geometric point.
2. Discern the endogenous and exogenous processes related to the evolution of a geological unit.
3. Establish temporal relationships between the different structures of a region.
4. Identify on the ground markers of the formation processes of minerals and rocks and establish their temporal relationships.
5. Identify on the ground the different types of tectonic structures, the temporal relationships between them and their significance.
6. Integrate outcrop-scale observations to make a regional-scale interpretation.
7. Interpret the physical conditions of their formation based on field criteria.
8. Interpret the structure of a region in a geodynamic context.
9. Learn and apply the knowledge acquired, and use it to solve problems.
10. Obtain information from texts written in other languages.
11. Obtain, process and interpret field data from a regional, multidisciplinary perspective.
12. Recognise in the field the different types of rocks and relate them to the processes that originated them.
13. Show initiative and adapt to problems and new situations.
14. Suitably transmit information, verbally, graphically and in writing, using modern information and communication technologies.
15. Synthesise and analyse information critically.
16. Synthesise field data to present regional-scale findings.
17. Work in different environments and localisations, with respect for diversity and multiculturalism.
18. Work in teams, developing the social skills needed for this.

Content

THEORY

The Variscan Massif of the Iberian Peninsula, its zoning and structure. Metamorphism and igneous rocks of the Variscan Massif.

Evolution of metamorphism. Age and characteristics of magmatism. Evolution of the Iberian Variscan orogen.

SEMINARS

Seminar on Stratigraphy and Paleontology of the region.

Seminar on geological resources of economic interest.

FIELD WORK

I. The Cantabrian Zone: the stratigraphic succession, structure of the Esla nappe, structure of Picos de Europa; resources of economic interest. Age of deformation.

II- The Westasturian-Leonese Zone: stratigraphic succession, structure, metamorphism and plutonism: - The Navia and Alto Sil Domain.

- *The structure of the Mondoñedo nappe.*

- *The Ollo de Sapo.*

III- The Galicia- Tras Os Montes zone:

- *The Cape Ortegal massif.* Lithology, age of the rocks and geotectonic meaning. Folds superposition.

Methodology

THEORY (4 h.)

- The Variscan Massif of the Iberian Peninsula, its zoning and structure (2 h).

- Metamorphism and igneous rocks of the Variscan Massif. Evolution of metamorphism. Age and characteristics of magmatism (1 h).

- Evolution of the Iberian Variscan orogen (1 h).

SEMINARS

Seminar on Stratigraphy and Paleontology of the region (4 h - 1.5 h evaluation of the seminar).

Seminar on geological resources of economic interest (4 h - 1.5 h evaluation of the seminar).

FIELD WORK (42 h = 33 directed work + 12 h evaluation during the field work)

6 field work days, making a transect, from the external to the internal zones, of the NW Iberian Variscan Massif.

Before leaving, the student must read the recommended references and will do a quiz (test) about them in order to go to the field with a basic knowledge of the area, having the necessary background to be located at all times within the geological context of the trip.

During the fieldwork it will be emphasized the development of a field notebook in which the student will collect the information of the outcrops or structures that are visited. Keeping the notebook up to date is strongly recommended, since it will be a basic element in the evaluation. At the end of each day there will be a quiz to evaluate the work done and there will be a random checking of the students' field notebook.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Field work	42	1.68	1, 15, 9, 13, 3, 5, 4, 6, 8, 7, 10, 11, 12, 16, 14, 17, 18
Seminar on Stratigraphy and Paleontology of the studied region	5	0.2	15, 9, 3, 6, 10, 14

Seminar on geological resources of economic interest	5	0.2	15, 9, 2, 3, 8, 10, 14
Theory	5	0.2	15, 9, 2, 3, 10, 14
Type: Supervised			
Evaluation during fieldwork	12	0.48	1, 13, 3, 5, 4, 6, 11, 12, 16, 17, 18
Examination on the contents of fieldwork	4	0.16	15, 9, 13, 2, 3, 6, 8, 7, 11, 16, 14
Pre-departure test on the evolution of the Northern branch of the Variscan Iberian Massif	2	0.08	15, 9, 2, 3, 8, 10, 14
Type: Autonomous			
Reading of bibliography and interpretation of maps	52	2.08	15, 9, 2, 10

Assessment

In order for a student to be evaluated, he / she must meet the following minimum requirements:

- Having attended every field day
- Have attended, at least, 80% of the theoretical sessions
- Have attended, at least, 80% of the presence of the seminars.

Assessment system for the acquisition of skills and qualification system:

- Evaluation of the Seminar on Geological Resources of Economic Interest 10%
- Evaluation of the Seminar on Stratigraphy and Paleontology of the region 10%
- Test before departure 10%
- *Evaluation of field work:*
 - Evaluation of daily work in the field (daily tests + field notebook) 30%
 - Final exam on the content of the fieldwork 40%

All exams and the Test before departure are required. The non-achievement of some of them prevents to pass the subject.

When the grade of some of the Seminars or the grade of the final Exam is less than 5 points, a retake exam will be necessary.

Achieve a grade lower than 3.5 points in the retake exam of any of the activities prevents to approve the subject.

If a student has carried out evaluation activities exceeding 35% of the total of the subject content, she / he will be graded as FAILED.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of daily work in the field (daily tests + field notebook)	30%	12	0.48	1, 9, 13, 2, 3, 5, 4, 6, 8, 7, 11, 12, 14, 17, 18

Final examination of the fieldwork	40%	4	0.16	15, 9, 13, 2, 3, 6, 8, 7, 16, 14
Pre-departure test on the evolution of the Northern branch of the Iberian Hercynian Massif	10%	4	0.16	15, 9, 3, 10, 14
Seminar on Stratigraphy and Paleontology of the studied region	10%	1.5	0.06	15, 9, 10, 14, 18
Seminar on geological resources of economic interest	10%	1.5	0.06	15, 9, 10, 14, 18

Bibliography

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- VAN DER PLUIGM, B.A. & MARSHAC, J, S. 1997. *Earth Structure, An introduction to Structural Geology and Tectonics*. WCB/McGraw-Hill. 495 pp.
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