Universitat Autònoma de Barcelona

2021/2022

Geology of the Iberian Massif Field Work

Code: 101029
ECTS Credits: 6

Degree	Type	Year	Semester
2500254 Geology	OB	3	2

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

Name: Joan Reche Estrada
Email: Joan.Reche@uab.cat

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

Joan Reche Estrada
Maria Mercè Corbella Cordomí
Elena Druguet Tantiña
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 passed the second year subjects and is taking (or has taken) the rest of the compulsory third year subjects.

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 ancient 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 Iberian Massif, its zoning and structure. Metamorphism and igneous rocks of the Variscan Iberian 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 West-Asturian-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-Trás-os-Montes zone:

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

Methodology

Theory:

- The Variscan Massif of the Iberian Peninsula, its zonation and structure (2 h).
- Variscan metamorphism and magmatism. Evolution of metamorphism. Age and characteristics of the magmatism (1 h). Evolution of the Iberian Variscan Orogen (1 h).

Seminars:

- The Stratigraphy and Palaeontology of the region (4 h-1.5 h evaluation of the seminar)
- Geological resources of economic interest (4 h-1.5 h evaluation of the seminar)

Field work:

6 field work days making a transect of the Variscan massif of the NW of the Iberian Peninsula, from the external to the internal zones (42 h = 33 guided field work + 12 evaluation during fieldwork). Before departure, the student must read the recommended bibliography and will do a previous test on those contents in order to ensure going to the field with a previous basic knowledge of the area and with the necessary material to be located at all times within the geological context of the trip, which undoubtedly facilitates understanding in the field. During the fieldwork, emphasis is placed on the elaboration of a personal field notebook in which each student will collect the information on the outcrops or structures that will be visited. A maximum of interest in keeping the notebook up to date is compulsory, since it will be a basic element in the evaluation. There will be several test for the work done during the field trip. The students may be required to present their field notebook (or exercises not included in the field notebook) to evaluate them during the development of the field trip. The last day of the field trip an evaluation of the totality of the contents of the field work will be done.

Teachers will spend approximately 15 minutes afterthe field trip to allow their students to answer the surveys for the evaluation of teaching performance and evaluation of the subject.

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.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Guided 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 region	5	0.2	15, 9, 3, 6, 10, 14

Seminar on geological resources of economic interest	5	0.2	15, 9, 2, 3, 10, 14
Theory	5	0.2	15, 9, 2, 3, 8, 10, 14
Type: Supervised			
Evaluation during fieldwork	12	0.48	1, 13, 3, 5, 4, 6, 11, 12, 16, 17, 18
Examination on the fieldwork contents	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

Degree of compulsory presential teaching

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

- Have attended the field every day

- Have attended, at least, 80% of the theoretical sessions

- Have attended, at least, 80% 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%

- Exam taken before departure to the field 10%

- *Evaluation of field work:*

Evaluation of daily work in the field (daily tests + field notebook + exercices) 30%

Final exam on the contents 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 score of some of the Seminars or the score of the final Exam on the fieldwork contents is less than 5 points, a retake exam will be compulsory.

The students will be allowed to make a retake exam on seminars or the final exam on the contents of the fieldwork items only

Achieve a grade lower than 3.5 points in the retake exam of any of the items 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 and he /she will be not allowed to be qualified as Unassessable.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of daily work in the field (daily tests + field notebook + exercices)	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 Variscan 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

ARAMBURU, C. & BASTIDA, F. (Eds.) (1995). *Geología de Asturias*. Ediciones TREA, S.L. Oviedo, 314 pp.

COMBA, J.A. 1983. Libro Jubilar J.M. Ríos Geología de España. IGME, Madrid, 656 pp.

GIBBONS W. & MORENO, T. (Eds.) (2002). The Geology of Spain. The Geologycal Society, London. 649 pp.

FOSSEN, H. 2010. *Structural Geology*. Cambridge University Press. Edimburg. 463 pp.

HATCHER, R.D. 1990. *Structural Geology*. Merrill Publishing Co. Columbus. 531 pp.

HOBSS, B.E., Means, W.D. & Williams P.F. 1981. *Geología Estructural*. Omega. Barcelona. 518 pp.

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

VERA, J.A. (Ed.) 2004.Geología de España. SGE-IGME. Madrid, 890 pp. ISBN: 847840-546-1.

Thecourse's Virtual campus provides several additionallinks to electronic learning resources.

Software

No specific software is required.