

26442 - Tectonics: Basins and Orogens

Syllabus Information

Academic year: 2024/25

Subject: 26442 - Tectonics: Basins and Orogens

Faculty / School: 100 - Facultad de Ciencias

Degree: 296 - Degree in Geology
588 - Degree in Geology

ECTS: 5.0

Year: 4

Semester: Second semester

Subject type: Optional

Module:

1. General information

Approaches and objectives:

- 1- To provide knowledge about crustal deformation processes on a regional scale.
- 2- To interpret tectonic structures in terms of these processes.
- 3- To make geological cross-sections as correct and accurate as possible from the geometric point of view in any structural domain.
- 4- To teach and apply the basic techniques for the restoration of geological cross-sections.
- 5- To incorporate geophysical data to perform deep cross-sections.
- 6- To provide knowledge of the fundamentals and basic techniques of analogue modelling of tectonic processes.
- 7- To show in the field the structural features of a basin and/or chain.

2. Learning results

Upon completion of this subject, the student will be able to:

- Know the processes by which crustal deformation occurs on a regional scale.
- Interpret the structures observed on a regional scale in terms of these processes.
- Perform geometrically correct geological cross-sections respecting the structural style of the area.
- Know and applies the basic techniques of restoration of geological cross-sections.
- Know the fundamentals and basic techniques of analogue modelling of tectonic processes.
- Manage bibliography in Spanish and English on the evolution of orogens, basins, and intraplate deformation.

3. Syllabus

- 1- Convergence. Subduction.
- 2- Collision. The Himalayas.
- 3- Anatomy of an orogen. The alpine orogenic belt. Circum-Pacific mountain ranges.
- 4- The European Hercynian orogen. The Caledonian chain. Precambrian tectonics.
- 5- Geometry of thrust faults.
- 6- Sedimentation in thrust systems.
- 7- Balanced geological cross-sections.
- 8- Experimental tectonics.
- 9- Transform and transcurrent faults. Transtension and transpression.

- 10- Rift zones. Aulacogens and passive margins. Salt tectonics.
- 11- Extensional tectonics. Geometry of normal fault systems.
- 12- Intraplate deformation. Intracontinental basins. Basement uplifts.
- 13- Inversion tectonics.
- 14- Folds with cleavage. superposed folding. Migmatitic domes and plutons.
- 15- Recent tectonics. Neotectonics. Seismotectonics.

4. Academic activities

50 hours of face-to-face activities, organized in theoretical sessions, guided practices and field work. The students will have notes as a basis for learning, and must complete the information received in the classroom by consulting technical books and scientific articles.

The material necessary for the development of the classes will be available via Moodle.

The program offered to the student includes the following activities:

- 1- Master classes (15 hours)
- 2- Papers and Seminars (2 hours)
- 3- Practical sessions of geological cross-sections in different structural domains (20 hours)
- 4- Practical work in the modelling laboratory (3 hours)
- 5- Field practice: Pyrenean traverse (10 hours)

5. Assessment system

CONTINUOUS ASSESSMENT

- 1- Resolution of two questionnaires and oral presentation in the seminars (each one groups half of the topics), and reading and commentary of a scientific paper published in an international journal on the evolution of orogens, basins or intraplate deformation (35%)
- 2- Delivery of the practices carried out in class (geological cross-sections and report of the experiment) (45%).
- 3- Delivery of a field trip report, in which the data and observations taken in the field are presented (20%). The field attendance is mandatory.

GLOBAL ASSESSMENT

- 1- Theoretical exam on the concepts explained in class and worked on in the questionnaires and seminars, and reading and commentary on a short scientific article (e.g. "extended abstract") presented at an international congress on the evolution of orogens, basins or intraplate deformation.
- 2- Practical exam: realization of a geological section.
- 3- Delivery of the report of the field trip, in which the data and observations taken in the field are explained, or examination on aspects of the structure and evolution of the Pyrenean mountain range (if for justified reasons it has not been possible to attend the field trip).

6. Sustainable Development Goals

- 4 - Quality Education