

60380 - Facies analysis and sedimentary models: principles and applications

Syllabus Information

Academic year: 2023/24

Subject: 60380 - Facies analysis and sedimentary models: principles and applications

Faculty / School: 100 - Facultad de Ciencias

Degree: 624 - Master's in Geology: Techniques and Applications

ECTS: 6.0

Year: 1

Semester: Second semester

Subject type: Optional

Module:

1. General information

Main objectives of the subject:

- To Interpret sediments and sedimentary rocks using different techniques.
- To understand the vertical evolution and lateral relationships of sedimentary successions.
- To know different sedimentary environments and the characteristics of their sediments.
- To study sedimentary sequences as a basis for the establishment of facies models.
- To reconstruct environments and sedimentation environments; to establish and interpret their evolution over time.
- To interpret the geological factors that control the evolution of sedimentary series and compare the changes observed in them with those at regional or global scale.

These goals are aligned with SDGs 4, 8, 9, 11, 12 and 13 of the United Nations 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>), so that the acquisition of the subject learning results provides training and competence to contribute to some extent to their achievement.

2. Learning results

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

- Know and interpret rocks and sedimentary systems as a preliminary step to the analysis of sedimentary basins.
- Understand the functioning of sedimentary environments, recognize their deposits in the geological record as a basis for the interpretation of their evolution over time and the proposal of predictive models, essential in the search and location of natural resources of sedimentary origin and in the prevention of natural risks.
- Understand and establish the lateral and vertical evolution of sedimentary successions and know how to interpret which factors have controlled their evolution.

3. Syllabus

Theoretical introduction

- Facies and facies analysis.
- Facies architecture, genetic factors and sedimentary models in continental environments.
- Facies architecture, genetic factors and sedimentary models in coastal marine environments. Sediment production and accumulation.

Practical classes:

- Facies architecture due to variations in production, accumulation and base level: examples with the *Carbonate* program.
- Alluvial-fluvial environment. Sedimentary models and heterogeneities at different scales. Control of allocyclic factors.
- Lacustrine environment: facies in lacustrine environments and their contribution to the interpretation of paleoenvironmental changes.
- Interrelationships between continental sedimentary systems and preservation potential.

- Thin-sheet facies analysis at outcrop scale of sandy sedimentary bodies (siliciclastic, carbonate) in shallow marine environments.
- Architectural elements and heterogeneity of bioconstructed facies in marine environments: fossil examples of coral reefs, sponge mounds and microbialites.
- Characterization and origin of sandy eventites in *offshore* areas.
- Characterization of organic-rich muddy deposits in *offshore* areas: accumulation rates, anoxia, climate and relative sea level variations.

Field practices

Facies architecture and heterogeneity in continental (Ebro Basin) and marine (Iberian Cordillera) sedimentary systems.

4. Academic activities

Theoretical-practical face-to-face classes (4-hour sessions)

After a theoretical introduction, we will work on, among others:

- Description and classification of hand specimens and study of thin sheets.
- Description and interpretation of borehole profiles or cores.
- Recognition of heterogeneities in sedimentary bodies.
- Physicochemical and geochemical analyses on sedimentary samples.
- Interpretation of sedimentary facies and sequences and analysis of genetic factors with respect to sediment production and stratigraphic architecture.
- Integration of results in two- and three-dimensional models.

Two field trips (16 hours)

Survey and data collection in sedimentary units:

- Continentals in the Pyrenees/Ebro Basin area
- Marinas in the Iberian Cordillera.

Non-face-to-face activities

Preparation of the work referred to in the assessment section.

5. Assessment system

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In order to pass the subject by continuous assessment, the student must submit two separate papers that and obtain a "pass" grade for both of them.

1. Study and interpretation of sediments and/or continental sedimentary rocks. Linked to field trip 1.
2. Study and interpretation of sediments and/or marine sedimentary rocks. linked to field trip 2.

In order to prepare this work, it is essential to attend the theoretical and practical classes and the planned field trips.

The grade obtained in each one will represent 50% of the grade for the subject. The data collected, its organization, the correct use of nomenclature and the interpretation of processes and subenvironments will be taken into account.

Global test: students who have not passed the subject by continuous assessment or who have not opted for this type of evaluation, will have to take a single theoretical-practical test of all the contents of the subject, whose assessment will represent 100% of the subject's grade.