

Academic Year/course: 2022/23

26441 - Applied Sedimentology and Coal & Petroleum Geology

Syllabus Information

Academic Year: 2022/23

Subject: 26441 - Applied Sedimentology and Coal & Petroleum Geology

Faculty / School: 100 - Facultad de Ciencias

Degree: 296 - Degree in Geology

588 - Degree in Geology

ECTS: 5.0

Year: 4

Semester: First semester

Subject Type: Optional

Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as theory sessions, laboratory sessions and fieldwork. Students are expected to participate actively in the class throughout the semester.

Further information regarding the course will be provided the first day of class.

4.2. Learning tasks

This course is organized as follows:

- **Theory sessions** (1.7 ECTS, 17 h). These sessions are dedicated to reinforce stratigraphic, sedimentological and Basin Analysis basic knowledge, but also to acquire new strategies related to the study of sedimentary, non-renewable energy resources, and geological processes controlling their genesis.
- **Laboratory sessions** (1.8, 18 h). Two-hour sessions that complement theory sessions.
- **Fieldwork**. (10% of the final mark). 3 field trips (1.5 ECTS) related to the study of sedimentary, non-renewable resources in Aragon. A brief test will be answered after each field trip.
 1. Coal deposits associated to transitional sedimentary environments (2 trips/days)
 2. Serrablo Natural Gas storage (1 trip/day).
- **Assessment tasks:**
 - 1. Students who have followed the practice sessions will present the results of two sessions selectet by the teacher. (30% of the final mark).
 - 2. Bibliographic essay (in pairs) focused on an oil basin and oral presentation. (30% of the final mark) focused on an oil basin using PowerPoint (or similar) for oral presentation (30% of the final mark) including the petroleum system and geological factors controlling the existence of the oil field.
 - 3. Short answer questions about field work (10% of the final mark).

- **4. Exam (3 hours).** Written exam focussed on theoretical and practice lectures (30 % of the final mark; a minimum mark of 4 is necessary for passing the exam).
- **Autonomous work and study**

Teaching and assessment activities will be carried out on site for as long and as much as possible. This scenario could change if recommended by safety regulations.

4.3. Syllabus

This course will address the following topics:

Lectures

1. Introduction to fossil resources. Renewable and non-renewable energy resources. Organic matter in sediments: production, accumulation and conservation. Controlling factors.
2. Coal. Definitions. The origin of coal. Mires. Main controls on mire development. Types of mires.
3. Sedimentary environments as organic matter producers. Continental, transitional and marine environments.
4. Coal components. Coal at macroscopical and microscopical scale. Maceral groups. Coal lithotypes and microlithotypes.
5. Coalification of organic matter. Controlling factors: T, P and time. Rank, components, and coal types.
6. Coal mining methods. Most common uses of coal.
7. Oil and natural gas. Physical and chemical properties. Composition of natural hydrocarbons. Main hydrocarbon families.
8. Origin and evolution of oil and natural gas. Transformations during the diagenesis and catagenesis. Kerogen: types and evolution. From kerogen to oil.
9. The source rock and oil migration. Identification and evaluation of the source rock. Primary and secondary migration.
10. The trap rock: petrophysical properties. Types of trap rocks.
11. The seal rock: geological and petrophysical properties. Effectiveness of sealing.
12. Oil traps. Types: stratigraphic, structural, mixed and hydrodynamic traps. Oil fields.
13. Interest of Oil Geology.

Practice sessions

1. Physical properties of sedimentary bodies and particles considering their potential interest for Applied Geology.
2. Research and prospection of natural resources associated to sedimentary environments.
3. Research, evaluation and prospection of coal deposits. Interest of mackerels.
4. Evaluation of the potential interest of hydrocarbon reserves.

Fieldwork

- Coal deposits associated to transitional sedimentary environments
 - Study on site. Main lithological and sedimentological features.
 - Mine restoration.
- Gas storage
 - The Serrablo gas field and its geological context: an example of gas geological storage.

4.4. Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of Sciences website (<https://ciencias.unizar.es>).

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=26441>