26441 - Applied Sedimentology and Coal & Petroleum Geology

Información del Plan Docente

Academic Year	2018/19
Subject	26441 - Applied Sedimentology and Coal & Petroleum Geology
Faculty / School	100 - Facultad de Ciencias
Degree	296 - Degree in Geology
ECTS	5.0
Year	4
Semester	First semester
Subject Type	Optional
Module	---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The course consists of three main complementary activities: theory and laboratory sessions and field works.

Theory 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 complement theory classes and both are dedicated to achieve the following main topics:

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a. Physical properties of sedimentary particles considering their potential interest for Applied Geology.

b. Main features of coal deposits and oil reservoirs as well as geological processes involved in their genesis.

c. Stratigraphical and sedimentological data in the characterisation and evaluation of deposits with economical interest.

During the field works (three days) many different subjects related to the course will be considered. a) Coal deposits associated to transitional sedimentary environments (2 days); b) Serrablo Natural Gas storage (1 day).

Students should write two reports in order to consolidate learning acquired during the course.

4.2.Learning tasks

- Theory sessions (25 hours).

- Laboratory sessions (15 h).

- 3 field trips related to the study of sedimentary, non-renewable resources in Aragon. A brief test will be answered after each field trip.

Assesment:

- Students must present two reports: i) one related with the possibilities of exploitation and use of sedimentary deposits at a given area, ii) a bibliographic pair work focused an oil basin.

- Short answer questions about field work.

- Examination.

4.3.Syllabus

Theory sessions:

- Introduction to fossil resources. Renewable and non-renewable energy resources. Organic matter in sediments: production, accumulation and conservation. Controlling factors.

- Natural resources associated to sedimentary environments.

- Coal. Definitions. The origin of coal. Mires. Main controls on mire development. Types of mires.

- Sedimentary environments as organic matter producers. Continental, transitional and marine environments.

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- Coal components. Coal at macroscopical and microscopical scale. Maceral groups. Coal lithotypes and microlithotypes.

- Coalification of organic matter. Controlling factors: T, P and time. Rank, components, and coal types. Characteristics of coal for industrial uses.

- Coal mining methods. Most common uses of coal and worldwide coal resources. Coal in Spain

- Coal and environment.

- Oil and natural gas. Physical and chemical properties. Composition of natural hydrocarbons. Main hydrocarbon families.

- Origin and evolution of oil and natural gas. Transformations during the diagenesis and catagenesis. Kerogen: types and evolution. From kerogen to oil.

- The source rock and oil migration. Identification and evaluation of the source rock. Primary and secondary migration.

- The trap rock: petrophysical properties. Types of trap rocks.

- The seal rock: geological and petrophysical properties. Effectiveness of sealing.

- Oil traps. Types: stratigraphic, structural, mixed and hydrodynamic traps. Oil fields.

- Interest of Oil Geology.

Practice sessions:

a) Physical properties of sedimentary particles considering their potential interest for Applied Geology.
b) Research and prospecting of natural resources associated to sedimentary environments.
c) Evaluation and prospecting of coal deposits.
d) Evaluation of the potential interest of hydrocarbon reserves.

Field work:

a) Coal deposits associated to transitional sedimentary environments: the Escucha Formation.
- Main lithological and sedimentological features.
- Mine restoration.

b) Serrablo natural gas storage: Visit to ENAGAS facilities in Sabiñánigo (Huesca).
- The gas field and the geological context.
- Example of gas geological storage.

4.4.Course planning and calendar

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This course is a first semester course. Classes will start the first academic week.
Students can refer to the Faculty of Sciences and Earth Sciences Department websites (https://ciencias.unizar.es;https://cienciastierra.unizar.es/) for timetable, classroom or assessment dates.
Further information regarding this course (examination, individual or group assignments...), will be provided on the first day of class.
Dates for each field trip will be published at the Earth Sciences Department website.
Tutorials: Office hours will be also provided the first day of class.

The course will consist of 5 ECTS (125 hours of student work) to be distributed as follows:

- 25 hours of lectures.

- 15 hours of practice classes. They will be spread over 8 sessions of 2 hours. The practice sessions will start the same week than theory classes.

- 3 field trips complementary to the theoretical and laboratory classes (10% of the final mark). Some short answer questions will be completed at the end of the field trip.

- **Report related to sedimentary natural resources** (30% of the final mark) including the possibilities of mining sedimentary deposits at a given area.

- **Presentation using power point of a bibliographic work related to an oil basin** (30% of the final mark) including the petroleum system and geological factors controlling the existence of the oil field.

At the beginning of practice sessions teachers will give to the students necessary information related to the report focused on aggregates.

The geographical area for the oil pair work will be proposed at the beginning of the course. The deadline for these works will be indicated the first day of classes.

- **Personal work**. It includes study and implementation of works and oral presentations.

- **3 hours of examination**. Written exam focussed on theoretical and practice lectures (30 % of the final mark; a minimum mark of 4 is necessary for passing the exam). On dates and places established by the Faculty of Sciences.

4.5.Bibliography and recommended resources