

Academic Year/course: 2022/23

## 26413 - Sedimentary Petrology

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 26413 - Sedimentary Petrology

**Faculty / School:** 100 - Facultad de Ciencias

**Degree:** 296 - Degree in Geology

588 - Degree in Geology

**ECTS:** 6.0

**Year:** 2

**Semester:** Second semester

**Subject Type:** Compulsory

**Module:**

## 1. General information

### 1.1. Aims of the course

This course is designed to cover the principles of Sedimentary Petrology and to provide a broad understanding on the characters and origin of the sedimentary rocks. The compositional, textural, structural and petrophysical characteristics of the sedimentary rocks, as well as their classification, will be studied. Effects of the diagenetical processes conducting to lithification will be analysed as a key point in the final properties of sedimentary rocks.

These objectives are in the line of the following Sustainable Development Goals of the UN 2030 Agenda (<https://www.un.org/sustainabledevelopment/>), in such a way that the acquisition of the knowledge given in this course provides the ability and competence to contribute to their achievement:

- SDG 4: Quality Education

### 1.2. Context and importance of this course in the degree

Sedimentary Petrology is one of the compulsory courses in the second year of the Geology Degree and it is included in the module called Fundamentals of Geology. It provides the foundation necessary for other geological disciplines dealing with sedimentary rocks.

### 1.3. Recommendations to take this course

It is recommended to have a continuous working plan with constant review of the theoretical and practical concepts and to use the resources indicated by the teachers in terms of web pages and academic tuition.

## 2. Learning goals

### 2.1. Competences

Upon successful completion of this course, students will be able to:

- Understand and apply the concepts and methods of Sedimentary Petrology.
- Recognize, describe and classify the different sedimentary rocks.
- Demonstrate an adequate understanding of the most important processes involved in the origin of sedimentary rocks.
- Apply the main laboratory and field techniques for the characterization of the sedimentary rocks.
- Relate and integrate what will be learned in this course with the rest of the disciplines in the degree.
- Effectively express themselves in written and oral form on topics dealing with Sedimentary Petrology.

### 2.2. Learning goals

Successful students will learn to:

- Apply fundamentals of Sedimentary Petrology for the interpretation of processes affecting sedimentary rocks formation.
- Recognize, describe and classify sedimentary rocks, identifying their main compositional, textural and structural characters in outcrops, hand samples and thin sections.
- Apply various laboratory techniques and optical microscopy for analyzing sedimentary rock compositions, textures, fabrics and the effects of diagenetic processes.

### 2.3. Importance of learning goals

Sedimentary Petrology is one of the core disciplines in the Earth Sciences, being also multidisciplinary and transversal. Thus, concepts and methodologies are frequently used in most of the other geological disciplines (as Mineralogy, Stratigraphy, Sedimentology, Geomorphology, etc.).

## 3. Assessment (1st and 2nd call)

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

There are two forms of evaluation: continuous assessment and end-of-term examination.

#### Continuous assessment

##### On the theoretical part

Student performance will be evaluated on the basis of theory quizzes about each lesson or group of lessons.

##### On the laboratory and microscope practical parts

Student performance will be evaluated on the basis of the petrographic description of a series of thin sections of detrital and carbonate rocks provided by the teachers, filling a series of description forms.

##### On the laboratory and microscope practical parts

Student performance will be evaluated on the basis of short reports or quizzes about the field trips.

#### End-of-term examination

Students who do not opt for the continuous assessment, or who do not pass them, shall attend the End-of-term Examination which consists of two parts:

- A theory test on the topics addressed during the course (this test will include multiple-choice questions, true/false questions and short answer questions).
- A practical test consisting in two parts: (1) lab/optical microscopy test with hand specimens and thin sections and (2) a test with short questions on the field trips performed during the course.

#### Marking system and assessment criteria:

The exam scores will be weighed as follows:

- Theory quizzes, 42.5% of the final grade: adequacy between question and answer, ability to summarise, define and assess, and clarity in the written expression.
- Lab reports/exercises, 42.5% of the final grade: correct identification of the compositional and textural elements, accuracy in the descriptive terminology, and correct classification of the specimens.
- Field trip reports, 15% of the final grade: ability to communicate the information, clarity, synthesis ability and correction in the descriptions and interpretations.

Each exercise considered in the final assessment will be graded from 0 to 10. The final grade will be obtained applying the percentages indicated for each part once each part has got 5 points or more over ten.

## 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. It is prepared in such a way that it will provide the students with the necessary link between the theoretical knowledge and its practical use in the Sedimentary Petrology field. A wide range of teaching and learning tasks are implemented, such as lectures, laboratory sessions, problem-solving sessions and fieldwork. The student will be able to recognise, describe and classify sedimentary rocks, identifying their main compositional, textural and structural characters in outcrop, hand samples and thin sections.

### 4.2. Learning tasks

This course is organized as follows:

- **Lectures** (2.0 ECTS: 20 hours). Two 55-minute sessions per week in which theoretical foundations of the course will be explained.
- **Practice sessions** (3.0 ECTS: 30 hours). One 2.5-hour weekly session of laboratory or problem-solving (optical microscopy). In these sessions various laboratory and fieldwork techniques and optical microscopy will be applied in order to analyse sedimentary rock compositions, textures, fabrics and the effects of diagenetic processes.
- **Fieldwork** (1.0 ECTS: 10 hours). Two daylong field trips are scheduled in this course.
- **Autonomous work and study** (84 hours).
- **Assessment tasks** (6 hours)

### 4.3. Syllabus

This course will address the following topics:

#### Lectures

- Introduction. The Petrogenetic cycle. Classification of sedimentary rocks.
- Diagenesis. Basic concepts: processes, stages and realms. Diagenetic grade indicators.
- Siliciclastic rocks. Textural and compositional characters. Classification. Diagenesis.
- Carbonate rocks. Mineralogy. Textural and compositional characters. Classification. Diagenesis.
- Evaporite rocks. The evaporation process. Deposit environments. Gypsum and anhydrite, Halitite. Diagenesis.
- Siliceous (chert) rocks. Petrographical varieties of silica. Stratified, nodule and continental cherts. Diagenesis.
- Iron-rich sedimentary rocks. Iron geochemistry. Mineralogical and textural characters. Diagenesis. Types of ferruginous rock.

#### Practice sessions

- Basic mineralogy in sedimentary rocks.
- Siliciclastic rocks: clasts, matrix and cements. Diagenetic processes
- Siliciclastic rocks: percentage estimation of textural components. Classification.
- Carbonate rocks: description of allochems (skeletal and non-skeletal grains) and orthochems (matrix and cements).
- Carbonate rocks: diagenetic processes and porosity types. Classification.
- Evaporitic rocks: description of calcium-sulfate rocks. Diagenesis.

#### Fieldwork

- There are two planned field trips, at the beginning and at the end of the semester. They cover an important variety of sedimentary rocks.

### 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 and Earth Sciences Department websites (<https://ciencias.unizar.es>, <https://cienciatierra.unizar.es>) and Moodle.

### 4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=26413>