

26413 - Sedimentary Petrology

Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	296 - Degree in Geology
ECTS	6.0
Year	2
Semester	Second semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

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

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology that will be applied has been prepared to provide the students with the necessary link between the theoretical knowledge and its practical use in the Sedimentary Petrology field.

The student will develop competences to be able to recognise, describe and classify sedimentary rocks, identifying their

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main compositional, textural and structural characters in outcrop, hand samples and thin sections.

The learning process will follow two complementary activities (next section).

5.2. Learning tasks

Activity 1: Lectures (2.2 ECTS). To develop the concepts and theoretical basis of the course. The course consists of two parts: Part 1 (Fundamentals), dedicated to the mineralogical, compositional, textural and structural characters of the main groups of sedimentary rocks and their classification. Part 2 (Diagenesis) covers the study of diagenesis and diagenetic processes of the sedimentary rocks.

Activity 2: Practical Sessions (3.8 ECTS). To apply various laboratory and field work techniques and optical microscopy for analysing sedimentary rock compositions, textures, fabrics and the effects of diagenetic processes. Practical classes are divided in three parts, laboratory methods, optical microscopy and field work.

This course consists of two 55-minute lectures and one 2.5-hours optical laboratory or microscopy session per week. Two all-day field trips are also scheduled in this course.

5.3. Syllabus

Lectures

Part I. Fundamentals

- Lecture 1. Introduction. The Petrogenetic cycle. Classification of sedimentary rocks.
- Lecture 2. Chemical and mineralogical composition of the sedimentary rocks.
- Lecture 3. Textural components of siliciclastic and carbonate rocks. Classification.
- Lecture 4. Textural components of chemical rocks.
- Lecture 5. Structures in sedimentary rocks.

Part II. Diagenesis

- Lecture 6. Diagenesis. Major diagenetic processes. Diagenetic stages and realms. Diagenetic grade indicators. Diagenetic textures and structures.
- Lecture 7. Diagenesis of siliciclastic rocks. Sandstones: shallow and burial diagenetic environments and processes. Mudrocks: diagenesis of clay minerals. Conglomerates and breccias: effects of compaction. Porosity and permeability.
- Lecture 8. Diagenesis of carbonate rocks. Cementation processes: mineralogy, texture and diagenetic environment. Dissolution processes and secondary porosity. Biogenic degradation processes. Neomorphism. Physical and chemical compaction. Dolomitisation: dolomitisation mechanisms and models. Dolomitisation and porosity. Dedolomitisation processes.
- Lecture 9. Diagenesis of evaporite rocks. Gypsum and anhydrite rocks. Halite rocks.
- Lecture 10. Siliceous (chert) and iron-rich sedimentary rocks. Origin. Mineralogical and textural characters.

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Diagenesis.

Practical classes

Part I. Laboratory

- Session 1. Sample preparation (weighing out, cutting, polishing, coding, etc.). Colour determination. Hardness and composition.
- Session 2. Structures and discontinuities. Textural analysis with acetate peels.
- Session 3. Mineral identification in hand specimens. Hardness, etching with acids, and staining. Observation with binocular lens.
- Session 4. Porosity determination by hydrostatic weighing.
- Session 5. Size measurements and granulometry. Phase separation.
- Session 6. Petrophysical characters. Measurement of sound propagation.
- Session 7. Photographic techniques. Drafting a report.

Part II. Optical microscopy.

- Session 1. Basic mineralogy in sedimentary rocks. Review of optical properties.
- Session 2. Siliciclastic rocks: clasts, matrix and cements.
- Sessions 3 and 4. Siliciclastic rocks: percentage estimation of textural components. Classification.
- Session 5. Carbonate rocks. Allochems: skeletal and non-skeletal grains.
- Session 6. Carbonate rocks. Orthochems: matrix and cements. Porosity types.
- Session 7. Carbonate rocks. Diagenetic processes.
- Session 8. Carbonate rocks. Classification.

Part III. Field works

- Field trip 1. Precambrian-Cambrian rocks outcropping near Calatayud village (Zaragoza).
- Field trip 2. Carbonate-evaporitic rocks of the Tertiary Calatayud Basin (Zaragoza).

5.4.Course planning and calendar

- Total Number of Hours of Student Work: 150
- Hour of Lectures: 22
- Hours of Practical/Problem Classes: 30
- Days of Fieldwork: 2

5.5.Bibliography and recommended resources

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|-----------|---|
| BB | Adams, A. E.. A colour atlas of carbonate sediments and rocks under the microscope / A.E. Adams, W.S. Mackenzie . - Reprinted London : Masson, 2001 |
| BB | Adams, A. E.. Atlas de rocas sedimentarias / A.E. Adams, W.S. |

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Mackenzie, C. Guilford ; version española, Marceliano Lago San José y Enrique Arranz Yagüe Barcelona [etc] : Masson, cop. 1997

BB Boggs, Sam, Jr.. Petrology of sedimentary rocks / Sam Boggs, Jr. . - 2nd ed. Cambridge : Cambridge University Press, 2009

BB Deer, W.A.. An introduction to the rock-forming minerals / W.A. Deer, R.A. Howie, J. Zussman . 2nd. ed., repr. [Harlow, England] : Longman Scientific & Technical, 1993

BB Füchtbauer, Hans. Sedimentary petrology / by W.v. Engelhardt, H. Füchtbauer , G. Müller. Part 2, Sediments and sedimentary rocks / [by Hans Füchtbauer and G. Müller]. 1 / by Hans Füchtbauer; with a contribution by Hans-Ulrich Schmincke . - 2nd rev. and enl. ed. Stuttgart : E. Schweizerbart'sche Verlagsbuchhandlung [Nägele u. Obermiller ;]aNew York [etc.] : John Wiley & Sons, 1974

BB Heinrich, E. WM.. Petrografía microscópica / E. WM. Heinrich ; traducción por Pablo Martínez Strong . - 2a ed. Barcelona : Omega, D.L. 1980

BB Pettijohn, Francis John. Rocas sedimentarias / F.J. Pettijohn ; traducida de la 2a. ed., 1957, por Juan Turner . - 3a. ed. Buenos Aires : Ed. Universitaria, 1976

BB Pettijohn, Francis John. Sedimentary rocks / F.J. Pettijohn . - 3rd ed. New York [etc.] : Harper and Row, cop. 1975

BB Tucker, Maurice E.. Sedimentary petrology : an introduction to the origin of sedimentary rocks / Maurice E. Tucker . 3rd ed. Malden [Etc] : Blackwell Publishing, 2001

BC Estratigrafía / Inmaculada Corrales Zarauza...[et al.] Madrid : Rueda, D.L. 1977

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- BC** Marfil, R. (1999). Diagénesis de rocas siliciclásticas. En: Dinámica de las interacciones entre agua y minerales en medios de baja temperatura (meteorización, diagénesis, metasomatismo) : reunión científica y curso extraordinario, 28 de septiembre-2 de octubre de 1999, Departamento de Geología, Universidad de Salamanca / editores, I. Armenteros, J.A. Blanco y E. Merino Salamanca : [s.n.], 1999, , pp. 23-54
- BC** Marfil, R. y De la Peña, J.A. (1989). Diagénesis: Rocas siliciclásticas y rocas carbonáticas. En: Sedimentología / Alfredo Arche, coordinador Madrid : Consejo Superior de Investigaciones Científicas, 1989, Vol. II, 343-427
- BC** Mas, J.R. y Alonso, A. (1989). La sedimentación carbonatada en mares someros. En: Sedimentología / Alfredo Arche, coordinador Madrid : Consejo Superior de Investigaciones Científicas, 1989, Vol. I, 11-36
- BC** Moreno, C. y Saez, R. (1990). Petrografía de arenitas: Una revisión. En: Boletín geológico y minero : revista bimestral de Geología Económica, Industrias Extractivas y de su beneficio Madrid : Instituto Geológico y Minero de España, 1967- [Publicación periódica]. v. 101, n. 1, pp. 153-167
- BC** Pueyo, J.J. (1999). Diagénesis y evaporitas. En: Dinámica de las interacciones entre agua y minerales en medios de baja temperatura (meteorización, diagénesis, metasomatismo) : reunión científica y curso extraordinario, 28 de septiembre-2 de octubre de 1999, Departamento de Geología, Universidad de Salamanca / editores, I. Armenteros, J.A. Blanco y E. Merino Salamanca : [s.n.], 1999, pp. 217-229

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LISTADO DE URLs:

Clasificación de Rocas de British
Geological Survey ("BGS rock
classification scheme") -
[<http://www.bgs.ac.uk/downloads/home.html>]

Glosario de Geología de la Real Academia
de Ciencias Exactas, Físicas y Naturales -
[http://www.ugr.es/~agcasco/personal/rac_geologia/rac.htm]