

26433 - Fundamentals of Petrogenesis

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	296 - Degree in Geology
ECTS	5.0
Course	4
Period	Second semester
Subject Type	Optional
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

This optional course is designed to introduce the basic concepts and principles about the mechanisms and processes that lead to the formation of the different rock types, their evolution and relationships at the global-dynamics scale. The study and parametrization of the geochemical signature of these processes are introduced as a basis for simple and complex modelling procedures.

The basic concepts will be developed in lectures and some of the subjects will be studied more in-depth by the students, through bibliographic search, synthesis and elaboration of short essays on the selected topics. These essays will be used for grading.

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The theoretical concepts will also be used in practical sessions, by means of case-studies and implementation of computer-aided calculation procedures applied to petrogenetic problems.

5.2.Learning activities

This course comprises four learning activities:

- Lectures (2,3 ECTS credits), developed in two fifty-minutes sessions per week.
- Laboratory practicals (1,4 ECTS credits), developed in seven two-hour sessions.
- Computer lab practicals (0,6 ECTS credits), developed in three two-hour sessions, for geochemical calculations and modelling.
- Field trips (0,7 ECTS credits); two one-day field trips are scheduled during the course.

English-language resources (bibliography and online resources) are to be used along the course both in lectures and practicals. These activities are equivalent to 1 ECTS credit in english language for the students.

5.3.Program

Lectures (2,3 ECTS)

1. Igneous and metamorphic petrogenetic processes:
 - 1.1. Metamorphic processes: factors and conditions of metamorphism.
 - 1.2. Compositional systems and their representation. Their relationship with the metamorphic facies concept. Model systems for pelites, carbonates and mafic rocks.
 - 1.3. Types of metamorphic reactions and their application to thermobarometric calculations. P-T-t paths and their geodynamic interpretation.
 - 1.4. The transition to igneous environments: melt-producing reactions and their products.
 - 1.5. Igneous processes. Melting environments: sources and their geochemical signature. Igneous series and suites.
 - 1.6. Magmatic differentiation: processes and their geochemical study.
 - 1.7. Intrusions: emplacement, configuration and their rheological and geochemical evolution.

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1.8. Volcanic systems: types, compositional evolution and the relationships of their dynamic with the plumbing systems.

1.9. The mantle-crust system; the relevance of igneous and metamorphic processes on the structure and evolution of the crust.

1. Sedimentary petrogenetic processes:

2.1. Fluid flow in the diagenetic environment and its petrogenetic consequences.

2.2. Silica behavior during diagenesis. Modelling the silica cementation process.

2.3. Diagenetic evolution of silica phases.

2.4. Dolomitization: mechanisms and genetic models.

2.5. Neogenesis: the example of the green micas.

2.6. Diagenetic evolution of sulphate rocks.

2.7. Phosphogenesis.

2.8. The influence of organic matter in diagenetic processes.

Practical sessions

Laboratory (1,4 ECTS)

Seven two-hour sessions, focused on the petrographic analysis and petrogenetic interpretations of metamorphic, igneous and sedimentary rocks, applying the theoretical concepts previously explained in lectures.

Geochemical calculation (0,6 ECTS)

Three two-hour sessions, coordinated with the laboratory sessions in which the students will apply general of specific software to the resolution of geochemical calculations.

Field practicals (0,7 ECTS)

Two all-day field trips are scheduled in this course, each one related to one of the units of the program. The goals of these field trips are the identification of the relationships amongst different rock units, the recognition of petrogenetic information in the field and the acquisition of the proper methodology to be applied in each case.

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5.4.Planning and scheduling

Planning of learning activities and scheduling of assessment dates

The scheduling of theoretical and practical classes and dates for examinations are published in the website of the Science Faculty (<https://ciencias.unizar.es/calendario-y-horarios>).

Week/Activity	1	2	3	4	Assessment/Essays
1	x				
2	x				
3	x	x			x
4	x	x			
5	x		x	x	
6	x	x			x
7	x	x			
8	x		x		
9	x	x			x
10	x	x			
11	x		x	x	
12	x	x			x
13					

5.5.Bibliography and recommended resources

BB

Best, Myron G.. Igneous and metamorphic petrology / Myron G. Best . - 2nd ed.

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BB Hibbard, Malcolm J.. Petrography to petrogenesis / M. J. Hibbard Englewood Cliffs (New Jersey) : Prentice Hall, 1995

BB Larsen, G. & Chilingar, G. V.. Diagenesis in Sediments and Sedimentary Rocks. Elsevier. 1979

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