

26420 - Geochemistry

Syllabus Information

Academic year: 2023/24

Subject: 26420 - Geochemistry

Faculty / School: 100 - Facultad de Ciencias

Degree: 296 - Degree in Geology

588 - Degree in Geology

ECTS: 7.0

Year: 3

Semester: First semester

Subject type: Compulsory

Module:

1. General information

This subject aims to provide the student with an understanding of: a) the factors that control the abundance and distribution of the chemical elements in the Solar System and on Earth; b) the behaviour of the elements in geological processes; and c) the geochemical methodologies to apply them to solve geological problems

This knowledge will allow the student to employ the geochemical methodologies that are most commonly used in other geological disciplines and to obtain a basis for the development of other related subjects (endogenous petrology, Environmental Geology, Applied Geochemistry, Mineral Deposits) and areas of knowledge (such as Environmental Sciences).

The subject is structured in two levels: (1) A first block (Fundamentals) introduces the concepts and methodologies necessary for the student to achieve the minimum learning results. (2) A second block (Applications) allows to deepen in specific applications of Geochemistry. The student who passes the first block has also passed the subject with a grade of 5, without the need to take the second block.

SDG 4

2. Learning results

Upon completion of the subject, the student will be able to:

Explain and manage in a clear way the basic concepts of Geochemistry, being able to relate the compositional characteristics of a geological system, at different scales, with the factors, variables and processes that have acted.

Identify and characterize the properties of different materials and geological processes by geochemical methods, selecting the most appropriate in each case.

Select the most appropriate analytical techniques for the study of geological samples, depending on the problem posed.

Use the techniques and quantitative approaches of the discipline for the processing of field and laboratory data, including basic geochemical modelling methodologies.

3. Syllabus

Theory Program (25h)

BLOCK I: FUNDAMENTALS (14h)

Topic 1. Geochemical classification of the elements.

Topic 2. Magmas and trace elements.

Topic 3. Isotopic geochemistry, 1: radioactive and radiogenic isotopes.

Topic 4. Isotopic geochemistry, 2: stable isotopes.

Topic 5. Physiochemistry of aqueous solutions.

Topic 6. Geochemistry of natural waters: speciation.

BLOCK II: APPLICATIONS (11h)

Topic 7. Geochemistry of sedimentary rocks.

Topic 8. Geochemistry of hydrothermal processes.

Topic 9. Geochemistry of magmas.

Topic 10. Early Earth.

Topic 11. The composition of the Earth.

Practical program: (44h)

BLOCK I: FUNDAMENTALS (24h)

Practice 1. Geochemical classification of various elements.

Practice 2. Models of magma melting and crystallization.

Practice 3. Radioactive isotopes.

Practice 4. Radiogenic isotopes as tracers. .

Practice 5. Stable isotopes: geothermometry.

Practice 6. Stable isotopes and paleoenvironments.

Practice 7. Reaction algebra.

Practice 8. Effect of temperature on solubility.

Practice 9. Silica system.

Practice 10. Carbonated system.

Practice 11. Aluminosilicates and stability diagrams.

BLOCK II: APPLICATIONS (20h)

Practice 12. Geochemical indicators and weathering.

Practice 10. Geochemical classification of detrital rocks.

Practice 11. Hydrothermal deposits.

Practice 12. Geochemical characterization diagrams of igneous rocks.

Practice 13. The age of the Solar System.

Practice 14. When was the Earth's core formed?

Practice 15. Composition of the Earth's primitive mantle.

4. Academic activities

Activity 1: Lectures (25 hours) for the detailed exposition of the concepts and theoretical bases of the subject with help of ICT's (25 hours in classes of 1 hour duration).

Activity 2: Problems and cases (45 hours) for the approach and resolution of problems. This activity is organized in 2-hour sessions, twice a week. Practice scripts are available to students through Moodle.

5. Assessment system

1. Continuous evaluation

Evaluation Activity 1 (50% of the grade of the subject):

At the end of Block 1 (Fundamentals) students will solve a quiz on the Theory topics of this block. A grade of 7 out of 10 or higher () allows the student to pass (with a 5) activity 1. If the minimum grade of 7 is not obtained , the student proceeds to the overall evaluation of activity 1.

At the end of Block 2 (Applications) there will be another quiz, which allows students who have passed activity 1 to obtain a grade between 5 and 10 in this activity.

The grade for this activity will be the grade obtained in Block 2 as long as Block 1 has been passed.

Evaluation of Activity 2 (50%):

At the end of Block 1 the students will have to solve some practical exercises related to the aspects explained in the office practices. A grade of 7 out of 10 or higher allows the student to pass (with a 5) activity 2. If the minimum grade of 7 is not obtained, the student proceeds to the overall evaluation of activity 2.

At the end of Block 2 there will be another quiz with practical exercises, which allows students who have passed activity 2 to obtain a grade between 5 and 10 in this activity.

The grade for this activity will be the grade obtained in Block 2 as long as Block 1 has been passed.

If both activities (1 and 2) are passed, the final grade is the weighted average of the two grades.

2. Overall evaluation

Students who do not opt for the continuous evaluation, or who do not pass the subject by this procedure, must take a global test consisting of two exercises.

- Evaluation Activity 1 (50% of the grade of the subject): questionnaire on the contents of the theoretical part of the subject Blocks 1 and 2.
- Evaluation of Activity 2 (50%): practical exercise in which the student will have to solve exercises related to the office practices of Blocks 1 and 2.

The grade of the subject for global evaluation is the weighted average of the grades of the two activities, provided that both are above 5.