Universitat Autònoma de Barcelona

2020/2021

Mineralogy

Code: 101058
ECTS Credits: 10

Degree	Type	Year	Semester
2500254 Geology	OB	2	A

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Maria Mercè Corbella Cordomí
Gerard Casado Aijon
Didac Navarro Ciurana
Lluís Casas Duocastella

Prerequisites

Some knowledge of Geology at a basic level like that of a 1st year of the Geology Degree is required, particularly of Crystallography and Chemistry.

Objectives and Contextualisation

1. To learn the concept of mineral and basic formation processes.
2. To understand the relation between structure and mineral properties.
3. To know the principal mineral groups, specifically their chemical composition, structure, properties and applications.
4. To use minerals properties in order to recognize and classify them, in a hand simple and under the transmitted light microscope.
5. To identify the main minerals of the Earth's crust, both in hand simple and under the transmitted light microscope

Competences

- Draw up and interpret geological maps and other means of depicting geological information (columns, correlation frames, geological cross-sections, etc.)
- Identify and characterise minerals and rocks through instrumental techniques, determine their formation environments and know their industrial applications.
- Learn and apply the knowledge acquired, and use it to solve problems.

- Process, interpret and present laboratory data using qualitative and quantitative techniques, and suitable computer programmes.
- Relate the physical properties of matter to its structure.
- Show an interest in quality and incorporate it into practice.
- Work in teams, developing the social skills needed for this.
- Work independently.

Learning Outcomes

1. Calculate mineral formulae from their composition.
2. Learn and apply the knowledge acquired, and use it to solve problems.
3. Present arguments based on phase diagrams.
4. Recognise rock-forming minerals and the principal ores in hand specimen and using a petrographic microscope.
5. Relate field observations of minerals and rocks to laboratory observations and to genetic theory, based on the textures.
6. Relate the physical properties of matter to its structure.
7. Show an interest in quality and incorporate it into practice.
8. Work in teams, developing the social skills needed for this.
9. Work independently.

Content

1. Basic concepts of Mineralogy, mineral classification and mineral genesis.

2. Crystallochemistry and crystallophysics: structure, properties and mineral study techniques.

-Chemical bonds, coordination, structures. Pauling rules. Spatial symmetry.

-Crystal morphology. Growth, habit, twinning, isomorphism. Crystal defects.

-Basics of X Ray diffraction and fluorescence.

-Physical properties of minerals. Cleavage, hardness, streak, color, luster. Luminescence and piezo- and pyro-electricity.

-Optical properties of minerals. Light and electromagnetic waves. Refraction index, polarization, Optical indicatrix. Pleocroism

-Mineral chemistry. Analytic techniques. Calculus of structural formula. Graphic representation of mineral composition. Mineral stability

3. Systematic description of minerals.

-Silicates: introduction and classification.

Tectosilicates. Silica group. Feldspars. Feldspatoids. Zeolites.

Phyllosilicates. Micas. Chlorites. Serpentines. Clay minerals.

Inosilicates. Pyroxenes and pyroxenoides. Amphiboles.

Sorosilicates. Epidote group.

Ciclosilicates. Beryl, cordierite, tourmaline.

Nesosilicates. Olivine group. Garnet group. Aluminosilicates.

-Carbonates. Borates. Sulfates. Wolframates and molibdates.

-Phosphates. Arsenates and vanadates.

-Oxides and hydroxides.

-Halides

-Sulfides and sulfosalts.

-Native elements.

4. Applied mineralogy. Gems, cements. Minerals and health. Nanomineralogy.

5. Mineral identification in hand sample.

6. Mineral identification under the transmitted light microscope.

Methodology

Theoretical sessions of 50 minutes each are programmed. The basic information is provided to students so that they can understand the content of the course. Besides, the graphic material used in class will also be provided though the Virtual Campus.

Practical sessions of 110 minutes each are progammed in the Microscopy Lab (C2/-160.1). The first ones are focused on mineral identification on hand samples with the aid of simple physical properties. Transmitted light microscopes will be used on the second part of the course; the principal rock-forming minerals will be identified. The teachers will share mineral identification tables in order to facilitate learning.

A one day field trip is also programmed with the course. It will serve to recognize minerals in nature and to comprehend their genesis.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Field work	7	0.28	2, 5
Practical classes	38	1.52	7, 4, 5, 9, 8
Theoretical classes	39	1.56	2, 1, 3, 6, 9
Type: Supervised			
Group tutory	6.5	0.26	8
Type: Autonomous			
Study and tasks	147.5	5.9	2, 7, 9, 8

Assessment

The competences and knowledge acquired in the theoretical and practical sessions will be evaluated separately.

Theoretical part: it will be graded with 4 partial exams, that could be re-taken at the end of the course. These exams correspond to the following parts: Crystallochemistry, Optical mineralogy, Structural Formulas and

Descriptive and applied mineralogy. The final grade of the theoretical part will be calculated according to the following weights: 30% Crystallochemistry, 20% Optical mineralogy, 15% Structural Formulas and 35% Descriptive and applied mineralogy, whenever a minimum of 3,5 (over 10 points) have been obtained in each partial exam. The final re-taking exam is programmed by the Faculty and advertised in its web page.

Practical part: 4 partial exams will be prepared, one for each set of pratical sessions, plus another one on the field trip. The weight of the different exams is: 10% mineral properties on hand samples, 30% mineral identification on hand sample, 15% mineral properties on the transmitted light microscope, 35% mineral identification under the transmitted light microscope, 10% field exam. It is necessary to obtain a minimum of 3,5 (over 10 points) in order to calculate the average grade. All these exams could be re-taken on the date indicated by the teachers at the end of all practical sessions.

If an exam is re-taken but the grade obtained is worst, the grade will be averaged with the previous one of that part.

The final grade of Mineralogy will be obtained from the average of theory (55%) and practical (45%) grades.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Practical Exams (4)	45% of the mark	6	0.24	2, 7, 4, 5, 9, 8
Theoretical exams: 4 parts	55% of the mark	6	0.24	2, 1, 7, 3, 6, 9

Bibliography

PUTNIS, A. (1992).- Introduction to Mineral Science. Cambridge University Press.

KLEIN, C. i HURLBUT, C.S. (1999).- Manual of Mineralogy (Revised 21st Edition). Wiley.

F.D. BLOSS (1994).- Introducción a los métodos de Cristalografía óptica. Omega.

MATA, J.M. (1988).- Guía d'identificació de minerals. Parcir. Manresa

WENK, H-R. i BULAKH, A. (2003).- Minerals. Their Constitution and Origin. Cambridge University Press.

http://www.uned.es/cristamine/inicio.htm