BACHELOR'S DEGREE
GEOCHEMISTRY
1ST YEAR OF STUDY, 1ST SEMESTER

COURSE TITLE	CRYSTALLOGRAPHY
COURSE CODE	31020030020SL1111103
COURSE TYPE	full attendance
COURSE LEVEL	1ST cycle (bachelor's degree)
YEAR OF STUDY, SEMESTER	1st year of study, 1st semester
NUMBER OF ECTS CREDITS	6
NUMBER OF HOURS PER WEEK	4 (2 lecture hours + 2 seminar hours)
NAME OF LECTURE HOLDER	Assistant Professor Andrei Ionuţ Apopei
NAME OF SEMINAR HOLDER	Assistant Professor Andrei Ionuţ Apopei
PREREQUISITES	

A GENERAL AND COURSE-SPECIFIC COMPETENCES

General competences:

→ Applying efficient work strategies so as to gain knowledge of Crystallography that will prove useful for the study of future academic disciplines (Descriptive Mineralogy, Mineralogenesis, Igneous Petrography, Metamorphic Petrography, Sedimentary Petrography, Geology of Ore Deposits)

Course-specific competences:

→ Identifying and understanding the main concepts and phenomena related to Geometric Crystallography (crystallogenesis, habitus, space groups etc.), plane-polarized light microscopy (Physical Crystallography), Radiocrystallography (X-ray diffraction) etc.

→ Understanding the functioning of the petrographic microscope as a tool in the identification of the optical properties of minerals

→ Understanding the functioning of the X-ray diffractometer

B LEARNING OUTCOMES

Upon successfully completing the discipline, students become capable of:

- identifying the axes, planes and centers of symmetry of various crystalline forms
- identifying the crystallographic system of a crystal
- identifying the properties of crystals based on microscopic studies with parallel nicols
- identifying the properties of crystals based on microscopic studies with crossed nicols
- identifying minerals based on X-ray diffraction

C LECTURE CONTENT

Week	Title of lecture	Teaching methods	Duration
1	Introduction (crystalline/amorphous substances, liquid crystals etc.)	Lecture, problematization	3 hours
2	I. Crystallogenesis I.1. Flaws in the crystal	Lecture	2.5 hours

	lattice		
3	I.2. Crystallogenetic processes	Lecture, problematization	3 hours
4	II. Geometric Crystallography II.1. The laws of Geometric Crystallography	Lecture, debate	2 hours
5	II.2. Analytical expressions and relations for facets and zones	Lecture	1.5 hours
6	III. Crystal symmetry III.1. Punctual symmetry	Lecture	6 hours
7	III.2. Lattice symmetry	Lecture	1.5 hours
8	IV. Physical Crystallography IV.1. Optical properties	Lecture, problematization	4 hours
9	IV.2. Magnetic and electrical properties IV.3. Cohesion-related properties	Lecture	1.5 hours
10	V. Radiocrystallography V.1. X-ray diffraction through crystals	Lecture	1 hour
11	V.2. Methods for the X-ray analysis of crystals	Lecture	2 hours

D RECOMMENDED READING FOR LECTURES

Rousseau, J-J. (1995) Cristallographie géométrique et radiocristallographie. Masson, Paris.
Putnis, A. (1993). Introduction to Mineral Sciences (chapters 1-7). Cambridge University Press, Cambridge.

E SEMINAR CONTENT

Week	Title of seminar	Teaching methods	Duration
1.	Visit to the Museum of Mineralogy	Debate	2 hours
2.	Identification of the axes of symmetry of crystallographic forms	Identification based on a model	2 hours
3.	Identification of the axes of symmetry of crystallographic forms	Identification based on a model	2 hours
4.	Identification of the planes and centers of symmetry of crystallographic forms	Identification based on a model	2 hours
5.	Identification of the planes and centers of symmetry of	Identification	2 hours

	crystallographic forms	based on a model	
6.	Identification of simple crystallographic forms	Identification based on a model	2 hours
7.	Identification of simple crystallographic forms	Identification based on a model	2 hours
8.	Identification of complex (composed) crystallographic forms	Identification based on a model	2 hours
9.	Identification of complex (composed) crystallographic forms	Identification based on a model	2 hours
10.	Identification of complex (composed) crystallographic forms	Identification based on a model	2 hours
11.	The petrographic microscope. Optical properties determined using parallel nicols	Identification under the petrographic microscope	2 hours
12.	The petrographic microscope. Optical properties determined using parallel nicols	Identification under the petrographic microscope	2 hours
13.	Optical properties determined using crossed nicols	Identification under the petrographic microscope	2 hours
14.	The petrographic microscope. Optical properties determined using crossed nicols	Identification under the petrographic microscope	2 hours
15.	Oral exam		2 hours

F	RECOMMENDED READING FOR SEMINARS
	American Mineralogist Crystal Structure Database (http://webmineral.com/data/) MacKenzie, W.S., Adams A.E. (1998). A Colour Atlas of Rocks and Minerals in Thin Section. Manson Publishing, London.
G	EDUCATION STYLE

LEARNING AND TEACHING METHODS	Lecture, problematization, debate, identification based on models and the petrographic microscope
ASSESSMENT METHODS	Written exam (30%) and continuous assessment (30%) (lecture), oral exam and continuous assessment (seminar) – 40%
LANGUAGE OF INSTRUCTION	English