

DESCRIPTION OF THE COURSE OF STUDY

Course code	0531.6.CHEM1.B/C.GiBŚ	
Name of the course in	Polish	Geochemia i biogeochemia środowiska
	English	Environmental geochemistry and biogeochemistry

1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

1.1. Field of study	chemistry
1.2. Mode of study	full-time studies/extramural studies
1.3. Level of study	undergraduate course
1.4. Profile of study*	general academic
1.5. Person/s preparing the course description	Agnieszka Gałuszka
1.6. Contact	Agnieszka.Galuszka@ujk.edu.pl, tel. 41-349-70-26

2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

2.1. Language of instruction	English/Polish
2.2. Prerequisites*	basics of chemistry

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

3.1. Form of classes	lecture classes
3.2. Place of classes	teaching rooms at Jan Kochanowski University
3.3. Form of assessment	lecture: oral exam classes: tests
3.4. Teaching methods	verbal methods: informational lecture classes: conversatory lecture, solving problems, discussion
3.5. Bibliography	Required reading
	Further reading

Albarède, F. (2009). *Geochemistry: an introduction*. Cambridge University Press.
Eby, G. N. (2004) *Principles of Environmental Geochemistry*. Brooks/Cole.
Manahan, S. E. (2022). *Environmental chemistry*. CRC Press.
Kabata-Pendias, A. (2000). *Trace elements in soils and plants*. CRC Press.

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

<p>4.1. Course objectives (including form of classes)</p> <p>Lecture:</p> <p>C1. The main objective of the course is to discuss the cycling and spatial distribution of elements as well as chemical compounds within and between various natural systems, with particular emphasis on the interactions between living organisms and various abiotic compartments</p> <p>C2. Familiarizing students with the environmental fate of trace elements and their impact on living organisms</p> <p>Classes:</p> <p>C1. The main objective of the course is to consolidate the knowledge provided during the lecture on the cycling and spatial distribution of elements, as well as chemical compounds within and between various natural systems, with particular emphasis on the interactions between living organisms and various abiotic compartments, as well as on the environmental fate of trace elements and their impact on living organisms</p> <p>C2. Familiarizing students with systematics, chemical composition, properties of minerals and rocks</p>
<p>4.2. Detailed syllabus (including form of classes)</p> <p>Lecture:</p> <ol style="list-style-type: none"> Geochemistry as a field of science. History, disciplines, overview of geochemistry and biogeochemistry. Zonal structure of the Earth and characterization of geochemical environments. Geochemical characterization of geospheres and outer layers of the Earth. The most important geochemical processes occurring in the pedosphere, hydrosphere, atmosphere and biosphere. Basic concepts in the field of mineralogy and petrology. Classifications of minerals and rocks. Geochemical factors and classifications of elements. Influence of pH, PEW, PE, colloids, complex compounds, radioactive transformations on the mobility of elements. Geochemical environments and processes in the lithosphere. Global geochemical cycles. Carbon cycle. Sulfur cycle. Nitrogen cycle. Oxygen cycle. Phosphorus cycle. Hydrogen cycle. The importance of the biosphere in the elements' cycling. Occurrence of isotopes in the natural environment. Selected radioactive and stable isotopes (S, O, H, C, N, Pb) and their application in geochemistry and environmental protection.

7. **Geochemical characterization of selected trace elements.** Geochemistry of arsenic, zinc, cadmium, manganese, copper, lead, mercury, selenium.
8. **Selected issues in the methodology of geochemical research.** Types of samples in geochemical research, basic information about sample collection and treatment. Chemical, mineralogical, petrological, and geophysical methods used in environmental geochemistry and biogeochemistry.

Classes:

1. During the classes, students under the guidance of the lecturer repeat and consolidate the knowledge gained during the lecture. In addition, students learn about the systematics, chemical composition and properties of selected minerals and rocks.

4.3 Intended learning outcomes

Code	A student, who passed the course	Relation to learning outcomes
within the scope of KNOWLEDGE:		
W01	knows geochemical phenomena and processes occurring in the environment	CHEM1A_W08
W02	defines basic terms in the field of environmental geochemistry and biogeochemistry	CHEM1A_W08
W03	explains the causes of the occurrence of specific geochemical processes in the environment, as well as the sources of origin, mobilization, transport and deposition of chemical elements and organic compounds	CHEM1A_W08
W04	has a basic knowledge of physicochemical and chemical factors influencing the cycling of elements	CHEM1A_W08
within the scope of ABILITIES:		
U01	formulates basic conclusions about the behavior of elements in the environment	CHEM1A_U09
U02	demonstrates the ability to critically approach and select information in the field of environmental geochemistry and biogeochemistry	CHEM1A_U09
U03	has knowledge of the use of various analytical methods and techniques in the study of various environmental samples	CHEM1A_U09

4.4. Methods of assessment of the intended learning outcomes

Teaching outcomes (code)	Method of assessment (+/-)			
	Exam (oral)		Test*	
	Form of classes		Form of classes	
	L	C	L	C
W01	+	—	—	+
W02	+	—	—	+
W03	+	—	—	+
W04	+	—	—	+
U01	+	—	—	+
U02	+	—	—	+
U03	+	—	—	+

*delete as appropriate

4.5. Criteria of assessment of the intended learning outcomes

Form of classes	Grade	Criterion of assessment
Lecture (L) * (including e-learning)	3	obtaining 50-60% of the total number of points from the answers on the exam
	3,5	obtaining 61-70% of the total number of points from the answers on the exam
	4	obtaining 71-80% of the total number of points from the answers on the exam
	4,5	obtaining 81-90% of the total number of points from the answers on the exam
	5	obtaining 91-100% of the total number of points from the answers on the exam
Classes (C) * (including e-learning)	3	obtaining 50-60% of the total number of points in written tests
	3,5	obtaining 61-70% of the total number of points in written tests
	4	obtaining 71-80% of the total number of points in written tests
	4,5	obtaining 81-90% of the total number of points in written tests
	5	obtaining 91-100% of the total number of points in written tests

5. BALANCE OF ECTS CREDITS – STUDENT'S WORK INPUT

Category	Student's workload
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	Full-time studies	Extramural studies
<i>NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/</i>	75	45
<i>Participation in lectures</i>	45	20
<i>Participation in classes</i>	30	25
<i>INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/</i>	50	80
<i>Preparation for the classes, seminars, laboratories*</i>	5	20
<i>Preparation for the exam/test*</i>	45	60
<i>TOTAL NUMBER OF HOURS</i>	125	125
ECTS credits for the course of study	5	5

**delete as appropriate*

Accepted for execution (date and legible signatures of the teachers running the course in the given academic year)

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