COURSE OFFERED

Name of the course	Polish	**Współczesne problemy geochemii środowiska**
	English	**Current issues in environmental geochemistry**

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

1.1. Section	Exact and Natural Sciences
1.2. Discipline	Chemical Sciences
1.3. Type of education	Stationary
1.4. Level of education	Doctoral School
1.5. Person preparing the course description	Prof. Dr. hab. Zdzisław Migaszewski
1.6. Contact	Zdzisław.Migaszewski@ujk.edu.pl

2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

2.1. Type of course	Disciplinary subject
2.2. Language of the course	English

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

3.1. Type of classes		Lecture, excercises
3.2. The number of hours		15h (lecture), 15h (excercises)
3.3. Location of classes		Classes in the UJK teaching room
3.4. Type of assessment		Exam (lecture) and graded credit (excercises)
3.5. Didactic methods		Presentation in PowerPoint and discussion
3.6. Literature	**basic**	DeVivo B., Belkin H., Lima A. 2017. Environmental geochemistry: site characterization, data analysis and case histories. Elsevier. Migaszewski Z.M., Gałuszka A. 2016. Geochemia środowiska. Wyd. Nauk. PWN. Warszawa. Schlesinger W.H. (ed..). 2003. Treatise on Geochemistry. Elsevier. Amsterdam.
	supplementary	Gałuszka A., Migaszewski Z.M., Namieśnik J. 2015. Moving your laboratories to the field – advantages and limitations of the use of field portable instruments in environmental sample analysis. *Environ. Res.* 140, 593-603. Gałuszka A., Migaszewski Z.M., Zalasiewicz J.A. 2014. Assessing the Anthropocene with geochemical methods. *Geol. Soc. Spec. Publ*. 395, 221-238. Scientific papers from different geochemistry journals "*Applied Geochemistry*", "*Elements*", "*Journal of Geochemical Exploration*", "*Environmental Geochemistry and Health*".

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDEND LEARNING OUTCOMES

4.1. Course objectives (including the form of classes)

C01. The principal objective of the subject is to get the knowledge to doctoral students about the state-of-the art trends in environmental geochemistry.

C02. Understanding the significance of sampling, sample preparation and geochemical, mineralogical and isotopic analyses of environmental samples for determining the provenance of contamination sources and the environmental quality, and pinpointing different crime offences and pollution perpetrators.

C03. Familiarizing doctoral students with the concept of Anthropocene in the context of human influence on natural ecosystems.

C04. Familiarizing doctoral students with the use of plants to search for mineral deposits, bioremediation and biomonitoring.

C05. Understanding a role of medical geochemistry in studying environmental quality and man's health.

C05. Understanding a role of geochemical and biogeochemical cartography in studying the occurrences of contaminated sites.

C06. Familiarizing doctoral students with a geochemical specificity of urban environments.

4.2. Syllabus content

1. Environmental geochemistry – definitions and its relationship to different scientific disciplines.
2. Sampling, sample preparation and field analytics (portable field instruments).
3. Basic issues linked to environmental geochemistry:

- geochemical background,
- geochemical baseline,
- geochemical coefficients for the environmental quality assessment,
- concept of geochemical gradient and barrier.

4. Anthropocene concept – an impact of man on the environment:

- mass extinctions,
- loss of biodiversity,
- changes in geomorphology,
- deforestation,
- pollution sources and large-scale man-made changes,
- changes in lithostratigraphy,
- isotopic, geochemical and technogenic proxies for the assessment of sediment contamination.

5. The use of plant bioindicators in environmental geochemistry and related disciplines:

- searching for mineral deposits,
- biomonitoring,
- bioreclamation, phytomining/phytoremediation, acid mine drainage,
- forensic geochemistry.

6. Application of geochemical and biogeochemical mapping in land use management and medical geochemistry.
7. The role of medical geochemistry in environmental studies.
8. Urban geochemistry – an insight into specific anthropogenically-induced environments.
9. The use of geochemical and mineralogical methods and techniques in forensic geochemistry.

5. SUBJECT LEARNING OUTCOMES

Learning outcomes	A doctoral student who has passed the subject:	Reference to the learning outcomes of Doctoral School (according to the training program at the Doctoral School)
in the area of KNOWLEDGE:		
W01	has the widened knowledge of environmental geochemistry including theoretical basis, general and selected detailed issues	SD_W01
W02	has the advanced knowledge of trends in environmental geochemistry and related disciplines	SD_W02
in the area of SKILLS:		
U01	is able to define the objective and research subject, formulate scientific hypotheses in environmental geochemistry and related disciplines	SD_U01
U02	is able to put to use the knowledge of environmental geochemistry, formulate and creatively resolve complex problems or accomplish research tasks	SD_U03
in the area of SOCIAL COMPETENCE:		
K01	is able to think in an enterprising way and actively act in selection of research methods and interpretation of results obtained	SD_K04

6. METHODS OF ASSESSMENT OF THE INTENDED LEARNING OUTCOMES

SUBJECT LEARNING OUTCOMES	METHOD OF ASSESSMENT (+/-)																				
	Oral/written exam			Test			Project			Activity in class			Own work			Group work			Others (PowerPoint presentation)		
	Type of classes			*Type of classes*			*Type of classes*			*Type of classes*			*Type of classes*			*Type of classes*			*Type of classes*		
	L	*E*	*S*	*L*	*E*	*S*	*L*	*E*	*S*	*L*	*E*	*S*	*L*	*E*	*S*	*L*	*E*	*S*	*L*	*E*	*S*
W01	+									+	+									+	
W02	+									+	+									+	
U01	+									+	+									+	
U02	+									+	+									+	
K01	+									+	+									+	

7. CRITERIA OF ASSESSMENT OF THE INTENDED LEARNING OUTCOMES

Form of classes	Grade	Criterrion of assessment
Lecture (L)	**3.0**	receiving 50-60% of the total points from exam
	3.5	receiving 61-70% of the total points from the exam
	4.0	receiving 71-80% of the total points from the exam
	4.5	receiving 81-90% of the total points from the exam

	5.0	receiving 91-100% of the total points from the exam
Excercises (E)	**3.0**	receiving 50-60% of the total points from the PowerPoint presentation
	3.5	receiving 61-70% of the total points from the PowerPoint presentation
	4.0	receiving 71-80% of the total points from the PowerPoint presentation
	4.5	receiving 81-90% of the total points from the PowerPoint presentation
	5.0	receiving 91-100% of the total points from the PowerPoint presentation

Accepted for execution

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