

Environmental geochemistry in the Anthropocene Educational subject description sheet

Basic information

Study programme Geohazards and Climate Change		Didactic cycle 2023/24	
Speciality -		Subject code 07GCCS.28P.02890.23	
Organizational unit Faculty of Geographical and Geological Sciences		Lecture languages English	
Study level Second-cycle programme		Course type Elective	
Study form Full-time		Block Basic subjects	
Education profile General academic			
Subject coordinator	Barbara Fiałkiewicz-Kozieł		
Lecturer	Barbara Fiałkiewicz-Kozieł, Michał Woszczyk		
Period Semester 4	Activities and hours Lecture: 15, Graded credit 		Number of ECTS points 2

Goals

Code	Goal
C1	The aim of the classes is to provide the understanding of basic chemical processes in natural and anthropogenically impacted environment.
C2	To outline the rage and timing of anthropogenic transformations of the environment with special emphasis on geochemical cycles.
С3	Familiarizing students with the concept of the Anthropocene.

Entry requirements

Basic knowledge of physical geography and geology.

Subject learning outcomes

Code	Outcomes in terms of	Learning outcomes	Examination methods
Knowledge - Student:			
W1	knows basic chemical processes in natural environment;	GCC_K2_W01, GCC_K2_W11, GCC_K2_W15	Project, Multimedia presentation
W2	knows anthropogenic pollutants including classifications and cycling in the environment;	GCC_K2_W01, GCC_K2_W03, GCC_K2_W07, GCC_K2_W11, GCC_K2_W15	Project, Multimedia presentation
W3	knows vocabulary linked to the Anthropocene.	GCC_K2_W03, GCC_K2_W15, GCC_K2_W17, GCC_K2_W18	Project, Multimedia presentation
Skills - Student:			
U1	distinguishes the Anthropocene in geological record;	GCC_K2_U01, GCC_K2_U03	Project, Multimedia presentation
U2	identifies differences between natural and anthropogenically-impacted geochemical cycles of major elements.	GCC_K2_U01, GCC_K2_U05, GCC_K2_U14	Project, Multimedia presentation
Social competences - Student:			
К1	reads scientific publications in the field of Anthropocene and is open for discussions on global environmental changes and anthropogenic pollution;	GCC_K2_K03, GCC_K2_K04, GCC_K2_K06	Project, Multimedia presentation
К2	is aware of the key role of human in ongoing global environmental changes;	GCC_K2_K02, GCC_K2_K03	Project
КЗ	is prepared to take measures mitigating the human impact on the environment.	GCC_K2_K01, GCC_K2_K02, GCC_K2_K03	Project, Multimedia presentation

Study content

No.	Course content	Subject learning outcomes	Activities
1.	Principles of environmental geochemistry. Natural and anthropogenic geochemical cycles.	W1, U2, K2	Lecture
2.	Types, fate and transport of pollutants.	W1, W2	Lecture
3.	Concept of Anthropocene and definitions; three types of anthropogenic factors sensu Waters; AME; GAEA.	W3, K3	Lecture
4.	Reading the environmental archives: peatlands, lakes, estuaries, marine sediments.	W2, W3, U1, K3	Lecture

No.	Course content	Subject learning outcomes	Activities
5.	The synchronous and diachronous deposition of technofossils and elements - discussion about creating hypothesis and projects.	W3, K1	Lecture

Additional information

Activities	Teaching and learning methods and activities	
Lecture	Lecture with a multimedia presentation of selected issues, Conversation lecture, Problem- based lecture, Discussion, Case study, Activating method - "brainstorming"	

Activities	Credit conditions
Lecture	 Preparing of the project (70% of th efinal grade) and presentation about this project (30% of the final grade): 1. very good (5.0) - from 90% of points, 2. good plus (4.5) - from 80% of points, 3. good (4.0) - from 70% of points, 4. sufficient plus (3.5) - from 60% of points, 5. satisfactory (3.0) - from 50% of points, 6. unsatisfactory (2.0) - below 50% of points.

Literature

Obligatory

- 1. Manahan "Environmental Chemistry", 10th Ed.
- Waters C.N., Williams M., Zalasiewicz J., Turner S.D., Barnosky A.D., Head M.J., Wing S.L., Wagreich M., Steffen W., Summerhayes C.P., Cundy A.B., Zinke J., Fiałkiewicz-Kozieł B., Leinfelder R., Haff P.K., McNeill J.R., Rose N.L., Hajdas I., McCarthy F.M.G., Cearreta A., Gałuszka A., Syvitski J., Han Y., An Z., Fairchild I.J., Ivar do Sul J.A., Jeandel C., 2022. Epochs, events and episodes: Marking the geological impact of humans, Earth-Science Reviews 234: 104171.
- 3. Berner, E.K., Berner, R., 1996. Global environment water, air and geochemical cycles. Prentice Hall.
- 4. Andrews, J.E., Brimblecombe, P., Jickells, T.D., Liss, P., 1996. An introduction to environmental chemistry. Blackwell Science
- 5. Gill, R., 2015. Chemical fundamentals of geology and environmental science. Wiley Blackwell

Optional

- Fiałkiewicz-Kozieł B., Łokas E., Smieja-Król B., Turner S.D., De Vleeschouwer F., Woszczyk M., Marcisz K., Gałka M., Lamentowicz M., Kołaczek P., Hajdas I., Karpińska-Kołaczek M., Kołtonik K., Mróz T., Roberts S.L., Rose N.L., Krzykawski T., Boom A., Yang H. (2022, in press) The Śnieżka peatland as a candidate for the Global Boundary Stratotype Section and Point for the Anthropocene series. The Anthropocene Review, doi.org/10.1177/20530196221136425
- Waters C.N., Zalasiewicz, J., Summerhayes C., Fairchild I.J., Rose N., Loader N.J., Shotyk W., Cearreta A., Head M.J., Syvitski J.P.M., Williams M., Wagreich M., Barnosky A.D., ,Zhisheng A., Leinfelder R., Jeandel C., Gałuszka A., Ivardosul J.A., Gradstein F., Steffen W., McNeill J.R., Wing S., Poirier C. and Edgeworth M., 2018. Global Boundary Stratotype Section and Point (GSSP) for the Anthropocene Series: Where and how to look for potential candidates. Earth-Science Reviews 178, 379-429.

Calculation of ECTS points

Lecture	15
Preparation of a project	20
Reading the indicated literature	15
Preparation of a multimedia presentation	10
Student workload	Hours 60
Number of ECTS points	ECTS 2

* academic hour = 45 minutes

Efekty uczenia się dla kierunku

Kod	Treść
GCC_K2_K01	The graduate is ready to implement and popularize actions serving the environmental protection
GCC_K2_K02	The graduate is ready to identify the influence of environmental processes onto the socio-economic processes, and also influence of anthropogenic activities onto the various components of the natural environment in various timescales
GCC_K2_K03	The graduate is ready to communicate, discuss and argue burning issues, hazards and problems associated with the climate, climate and environment changes for wider, non-scientific audience
GCC_K2_K04	The graduate is ready to use reliable sources of information associated with environmental hazards and climate and critical assessments of these sources
GCC_K2_K06	The graduate is ready to think and act creatively
GCC_K2_U01	The graduate can vary between natural and anthropogenic causes of climate change and associated environmental changes and geohazards
GCC_K2_U03	The graduate can conclude based on the data and information from various sources and geographical and environmental information
GCC_K2_U05	The graduate can an extended degree use the scientific terminology and vocabulary, read the advanced scientific literature with understanding
GCC_K2_U14	The graduate can describe in extended degree environmental components and their relationships
GCC_K2_W01	The graduate knows and understands thoroughly, the processes operating in the natural environment, their causes, mechanisms, consequences and associated geohazards
GCC_K2_W03	The graduate knows and understands thoroughly, endogenic processes, anthropogenic influence on endogenic processes and following from them geohazards
GCC_K2_W07	The graduate knows and understands thoroughly complex socio-economic processes in the local, regional and global scale and their influence on the occurrence of extreme environmental events
GCC_K2_W11	The graduate knows and understands advanced laboratory methods and techniques used in the research on the elements of the environment and the environmental processes
GCC_K2_W15	The graduate knows and understands advanced vocabulary associated with climate change, natural environment and geohazards
GCC_K2_W17	The graduate knows and understands thoroughly, the literature in the field of climate change, geohazards as well as basic environmental and social research
GCC_K2_W18	The graduate knows and understands thoroughly, the most up to date trends in science and implementation of the newest scientific achievements in studies field