UNIWERSYTET IM. ADAMA MICKIEWICZA W POZNANIU

Application of Scanning Electron Microscopy - Energy Dispersive Spectroscopy in Earth sciences

Educational subject description sheet

Basic information

Study programme Geohazards and Climate Change	**Didactic cycle** 2023/24
Speciality -	**Subject code** 07GCCS.24KU.05741.23
Organizational unit Faculty of Geographical and Geological Sciences	**Lecture languages** English
Study level Second-cycle programme	**Course type** Elective
Study form Full-time	**Block** Complementary major subjects
Education profile General academic	

Subject coordinator	Danuta Michalska
Lecturer	Danuta Michalska

Period	**Activities and hours**	**Number of ECTS points**
Semester 3	• Lecture: 15, Graded credit	2

Goals

Code	Goal
C1	Providing students with knowledge in the field of microscale observations along with semi-quantitative analysis on various examples.
C2	To develop a research question/problem related to geohazards or environmental change that can be solved using SEM.
C3	To develop a practical ability in collection and interpretation of SEM-EDS data.
C4	Familiarizing student with the scientific research results presentation.

Entry requirements

Basic knowledge in Earth Sciences (at the secondary school level).

Subject learning outcomes

Code	Outcomes in terms of	Learning outcomes	Examination methods
Knowledge – Student:			
W1	knows SEM-EDS method that can be used to investigate research problems related to geohazards and environmental changes.	GCC_K2_W01, GCC_K2_W11	Multimedia presentation
Skills – Student:			
U1	processes data to solve the selected research problem;	GCC_K2_U03, GCC_K2_U04, GCC_K2_U07, GCC_K2_U08, GCC_K2_U10	Multimedia presentation
U2	presents obtained results as clear and readable diagrams and text;	GCC_K2_U04, GCC_K2_U07, GCC_K2_U08, GCC_K2_U10	Multimedia presentation
U3	works in a small group, sharing responsibilities and tasks.	GCC_K2_U16, GCC_K2_U17	Multimedia presentation

Study content

No.	Course content	Subject learning outcomes	Activities
1.	Applications of SEM-EDS to analysis of environmental changes.	W1, U2	Lecture
2.	SEM-EDS observations of selected samples and/or students' own samples.	W1, U1, U2, U3	Lecture
3.	Supervised work on students’ projects (group work).	W1, U1, U2, U3	Lecture

Additional information

Activities	Teaching and learning methods and activities
Lecture	Lecture with a multimedia presentation of selected issues

Activities	Credit conditions
Lecture	Multimedia presentation of collected data and results (100% of final grade) Grading scale: • very good (5,0): > 90% • good plus (db plus; 4,5): > 80% • good (db; 4,0): > 70% • sufficient plus (dst plus; 3,5): > 60% • satisfactory (dst; 3,0): > 50% • unsatisfactory (ndst; 2,0): <=50%

Literature

Obligatory

1. Duczmal-Czernikiewicz, A., Michalska, D. 2018 – Mineralogy and microstructure of the Morasko meteorite crust. Planetary and Space Science, 164: 44–53.
2. Łącka, M., Michalska, D., Pawłowska, J., Forwick, M., Zajączkowski, M. 2020 – Multiproxy paleoceanographic study from the western Barents Sea reveals dramatic Younger Dryas onset followed by oscillatory warming trend. Scientific Reports, 10 (1), 15667.

Optional

1. Goldstein J.I., Newbury D.E., Echlin P., Joy D.C., 2005 - Scanning Electron Microscopy and X-Ray Microanalysis.
2. Reed S. J. B., 2005 - Electron Microprobe Analysis and Scanning Microscopy in Geology. Cambridge University Press.

Calculation of ECTS points

Activities	Activity hours*
Lecture	15
Preparation for classes	5
Reading the indicated literature	20
Preparation of a multimedia presentation	20
Student workload	**Hours** 60
Number of ECTS points	**ECTS** 2

* academic hour = 45 minutes

Efekty uczenia się dla kierunku

Kod	Treść
GCC_K2_U03	The graduate can conclude based on the data and information from various sources and geographical and environmental information
GCC_K2_U04	The graduate can formulate the research hypotheses and conduct environmental research: to plan, to manage and to document
GCC_K2_U07	The graduate can look for and select the necessary information from the scientific literature and other written sources and based on that learm and continuously update the knowledge throughout the life
GCC_K2_U08	The graduate can apply advanced laboratory methods and techniques used for environmental research
GCC_K2_U10	The graduate can apply health and safety rules and regulations in the office, in the laboratory and in the field
GCC_K2_U16	The graduate can transparently and accessibly present the Earth and environmental sciences topics
GCC_K2_U17	The graduate can cooperate in the team, efficiently plan the work for her/himself and the research/task team
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_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