University of Gdańsk

Subject card

Subject name and code	Geophysics and Geochemistry - laboratory, PG_00193786						
Field of study	Geography						
Date of commencement of studies	October 2027		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		1.0		
Learning profile	academic		Assessment form		credit		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Maurycy Żarczyński				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	10.0	0.0	0.0	10
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	10		5.0		10.0	25
Subject objectives	Introduction to laboratory infrastructure used in geophysical and geochemical research, development of practical laboratory skills through loss-on-ignition (LOI) analysis, and building the ability to independently research and present selected topics concerning the physical principles and applications of analytical and measurement methods in Earth sciences.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[GEOGRL3-U01] can dentify and analyze basic natural and socio-economic processes and phenomena, analyze their causes and course, and formulate and discuss basic issues concerning physical-geographical conditions and the social, economic, and political situation and their changes on various spatial scales	Identifies and interprets geophysical and geochemical processes based on laboratory analysis results.	[SU2] presentation/project/paper/ report
[GEOGRL3-W02] knows and understands key concepts and theories in geography, as well as advanced processes and phenomena related to spatial diversity and the distribution of processes and phenomena on the Earth's surface at various spatial scales, particularly in Poland	Describes the physical principles of selected analytical and measurement methods used in geophysical and geochemical research.	[SW4] test/exam - oral or written
[GEOGRL3-U03] can plan and conduct, independently and as part of a team, simple research in the field of geography under the supervision of a scientific advisor, based on the necessary information from professional literature and other sources	Plans and conducts, as part of a team, a literature review and prepares and presents a selected topic in geophysical or geochemical research methods.	[SU3] text preparation/written work
[GEOGRL3-U04] can apply field and laboratory methods and research tools, spatial analysis methods, and methods of presenting research results in the field of geography, assess their usefulness for tasks in which the application goal of geography can be realized	Applies basic laboratory methods to analyse physical and chemical properties of sediment samples and processes and visualises the obtained results.	[SU2] presentation/project/paper/ report
[GEOGRL3-U05] can use scientific language and express opinions and discuss topics related to geography in Polish and a foreign language	Uses scientific terminology in geophysics and geochemistry in both oral and written form.	[SU2] presentation/project/paper/ report [SU3] text preparation/written work

Subject contents

- Introduction to laboratory infrastructure: hyperspectral imaging (HSI) laboratory, spectrometric laboratory, sedimentological laboratory, geochemical laboratory.
- Loss-on-ignition (LOI) analysis preparation of sediment samples, weighing, principles of working with a muffle furnace and analytical balance.
- Loss-on-ignition (LOI) analysis post-ignition weighing, calculation of organic matter content, data sharing and compilation, data visualisation, report preparation.
- Physical principles and applications of spectroscopy X-ray fluorescence (XRF) and hyperspectral imaging (HSI).
- Physical principles and applications of alpha (α), beta (β) and gamma (γ) spectrometry.
- Physical principles and applications of geophysical survey methods in terrestrial and aquatic environments.
- End-of-course test on presentation topics.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written summary	51.0%	10.0%
Written test	51.0%	30.0%
Analysis report	51.0%	20.0%
Group presentation	51.0%	40.0%

Recommended reading	Basic literature	• Fedorowicz S., 2008, Geofizyka i geochemia. Skrypt dla studentów kierunku geografii, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk • Migaszewski Z.M., Gałuszka A., 2016, Geochemia środowiska, Wydawnictwo Naukowe PWN, Warszawa • Heiri O., Lotter A.F., Lemcke G., 2001, Loss on ignition as a method for estimating organic and carbonate content in sediments: reproducibility and comparability of results, Journal of Paleolimnology, 25, 101110
	Supplementary literature	• Pokojska U., Bednarek R. (red.), 2012, Geochemia krajobrazu, Wydawnictwo Naukowe UMK, Toruń • Polański A., Smulikowski K., 1969, Geochemia, Wydawnictwa Geologiczne, Warszawa • Stenz E., Mackiewicz M., 1964, Geofizyka ogólna, PWN, Warszawa
	eResources addresses	
Example issues/ example questions/ tasks being completed	• Calculate the percentage of organic matter in a sediment sample based on the given pre- and post-ignition masses. • List and briefly characterise the steps of loss-on-ignition (LOI) analysis. • Describe the physical principles of a selected analytical method used in geochemical research and provide an example of its application. • Identify the difference between alpha, beta and gamma spectrometry in terms of the type of radiation emitted. • Interpret a profile of organic matter variability in a sediment core what might the observed changes indicate? • Prepare, as a team, a presentation on a selected research method used in geophysics or geochemistry, covering its physical principles and examples of applications. • Based on obtained laboratory analysis results, prepare a report including a data compilation, chart and interpretation of results.	
Work placement	Not applicable	

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