

Fundamentals of geophysics - course description

General information	
Course name	Fundamentals of geophysics
Course ID	13.2-WF-FizD-FG-S19
Faculty	Faculty of Physics and Astronomy
Field of study	WFiA - oferta ERASMUS
Education profile	-
Level of studies	Erasmus programme
Beginning semester	winter term 2023/2024

Course information	
Semester	1
ECTS credits to win	3
Course type	obligatory
Teaching language	english
Author of syllabus	<ul style="list-style-type: none">dr Agnieszka Gontaszewska-Piekarz

Classes forms					
The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	30	2	-	-	Credit with grade
Laboratory	15	1	-	-	Credit with grade

Aim of the course

Students have basic knowledge of processes occurring in inanimate nature. They know and understand the connections between various geological processes.

Students have basic knowledge about the application of various geophysical methods in practice. They know the theoretical foundations of these methods and can interpret their results.

Prerequisites

Basics of geography and physics at high school level, knowledge of the physical map of Poland.

Scope

Lecture 1: Introduction to geophysics, basic terminology. Disciplines, goals and tasks of geophysics. Basic theories used in Earth sciences: the principle of geological update, theory of evolution

Lecture 2: Physical and chemical characteristics of the Earth. Hypsometry. Structure of the Earth's interior based on geophysical research.

Lecture 3: Geochronology. Age of the Earth. Methods for determining the age of rocks, dating.

Lecture 4: Geodynamics. Earth tectonic models. Drift theory. Theory of lithospheric plates. Other geotectonic theories. Types of lithospheric plates contacts.

Lecture 5: History of the Earth. Stratigraphic division. Characteristics of geological periods. The origin of life. Evolution. The origin of man.

Lecture 6: Seismology. Earthquakes, seismic waves and their registration. Hypocenter and epicenter. Earth seismicity. Seismicity of Poland. The effects of earthquakes. The structure of the Earth's interior on the basis of seismic studies. Endogenous processes.

Lecture 8 Basics of petrophysics. Physical properties of rocks and their relationship with geophysical anomalies. Igneous processes. Volcanism and plutonism. Metamorphism. Formation of igneous and metamorphic rocks.

Lecture 9 Basics of gravity. Ellipsoid, geoid, geoid undulations. Earth's gravity field. Methods of measuring gravity. Gravitational anomalies.

Lecture 10 Magnetometry. Earth's magnetic field and its description. Magnetosphere. Variations of the magnetic field. Magnetic properties of rocks. Magnetic anomalies. Paleomagnetism.

Lecture 11. Geothermal energy. Earth's thermics. Earth's heat field. Earth's internal heat. Hot spots. Coat plumes. Practical use of the Earth's heat. Heat pumps

Lecture 12. Applied geophysics. Methods, examples. Electric exploration methods. Reflexive and refractive seismic.

Lecture 13. Borehole (drilling) geophysics. Borehole geophysics profiling. Resistance profiling. Gamma profiling. Acoustic profiling.

Lecture 14. Natural and excited radioactivity. Nuclear geophysics. ground penetrating radar

Lecture 15: Geological structure of Poland and raw material deposits

Laboratory: Identification of basic rock types, interpretation of geological structure. The use of geological maps. Interpretation of results of electrofusion and seismic tests.

Teaching methods

Lecture - presentations

Laboratory - work with samples of rocks and minerals, lecture, work on sample geophysical research results.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Students know the methods of geophysical research, understands the connections between geophysics and geology		<ul style="list-style-type: none">• activity during the classes	<ul style="list-style-type: none">• Lecture• Laboratory
Students know the basic terminology, goals and concepts used in geophysics;		<ul style="list-style-type: none">• an evaluation test	<ul style="list-style-type: none">• Lecture
Students can interpret the results of geophysical research in the basic range.		<ul style="list-style-type: none">• an observation and evaluation of the student's practical skills	<ul style="list-style-type: none">• Laboratory
Students will obtain the fundamentals of geophysics that allow to exchange of views, critical assessment of information and they understand the need to update his knowledge.		<ul style="list-style-type: none">• activity during the classes	<ul style="list-style-type: none">• Lecture• Laboratory

Assignment conditions

Lecture - the pass condition is to obtain a positive grade from the test.

Laboratory - the pass condition is to obtain positive grades from all projects and a practical colloquium on rock identification

Recommended reading

1. Fajkiewicz Z. (red.), "Zarys geofizyki stosowanej". Wydawnictwa Geologiczne, Warszawa.1972.
2. Mortimer Z., "Zarys fizyki Ziemi". Wydawnictwa AGH. Kraków. 2004.
3. Plewa S., "Geofizyka wiertnicza". Wydawnictwo Śląskie, Katowice 1972.
4. Stanley „Historia Ziemi” Wyd. Naukowe PWN, Warszawa 2002
5. Kołodziejczyk U. Kraiński A. „Zarys geologii” Oficyna Wydawnicza Uniwersytetu Zielonogórskiego, Zielona Góra, 2003
6. Książkiewicz M. „Geologia dynamiczna” Wyd. Geologiczne, Warszawa, 1979

Further reading

Mannion A. „Zmiany środowiska Ziemi” , Wyd. Naukowe PWN, Warszawa 2001

Lowrie W., Fundamentals of Geophysics. Cambridge University Press.2007

Notes

Modified by dr Marcin Kośmider (last modification: 06-02-2023 22:44)

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