University of Gdańsk

Subject card

Subject name and code	Factors influencing the environment: measurements, analyses, and future challenges., PG_00171825		
Field of study	Environmental Protection		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	Bachelor's studies	Subject group	Optional subject group
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	6	ECTS credits	2.0
Learning profile	academic	Assessment form	credit
Conducting unit	Laboratory of Intermolecular Interactions -> Department of Bioinorganic Chemistry -> Faculty of Chemistry -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Agnieszka Chylewska	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	30.0	0.0	0.0	30

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	30	2.0	28.0	60

Subject objectives

The objective of the course is to introduce students to the basic methods and techniques used in environmental analysis, focusing on the measurement of abiotic factors that are crucial for the functioning of ecosystems. Students will gain knowledge about the impact of factors such as temperature, humidity, pH, chemical composition of soil and water, and solar radiation on ecosystem health and biodiversity.

The course will provide an understanding of various methods for measuring these factors in different environments, including water, soil, and air. Students will learn how to measure temperature, humidity, pH, chemical composition of soil and water, and solar radiation, and understand how these factors influence biological, physical, and chemical processes in ecosystems.

Through laboratory and field exercises, students will have the opportunity to conduct measurements in various environments, analyze the collected data, and interpret the results, considering their impact on the environment. The course will also help develop skills in writing scientific reports and understanding how different abiotic factors interact with one another, which is essential for a comprehensive understanding of ecosystem functioning.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[OŚL3_K02] Works individually demonstrating initiative and independence in actions, and effectively cooperates in a team, performing various roles in it.	The student takes responsibility for their tasks and contributions to teamwork, ensuring high-quality performance of the duties entrusted to them. The student actively engages in collaboration with other team members, sharing knowledge, ideas, and experience, and is open to constructive criticism. The student understands the importance of cooperation within a group and effectively utilizing the potential of each team member to achieve a common goal. The student is aware of their role in the team and is able to adapt their actions to changing circumstances and the needs of the group.	[SK2] presentation/project/paper/ report
[OŚL3_K08] Is responsible for and takes care of the specialist equipment entrusted to her/him for research and laboratory or field work.	The student takes responsibility for the equipment entrusted to them, ensuring its good technical condition and using it according to its intended purpose. The student is able to collaborate with other team members in using specialized equipment, sharing knowledge and experience related to its operation and maintenance. The student takes actions to protect the equipment and prevent its damage or misuse, especially in situations that require working under challenging conditions (e.g., in the field). The student demonstrates awareness of the importance of proper equipment use to ensure the quality and reliability of the conducted research.	[SK2] presentation/project/paper/ report
[OŚL3_W02] Characterises the relationships and relationships between various disciplines of natural sciences and science, uses knowledge of mathematics, physics, chemistry and biology in the description of basic concepts, concepts and principles in environmental protection.	The student possesses advanced knowledge of the relationships and connections between various scientific disciplines, including mathematics, physics, chemistry, and biology, in the context of environmental protection. The student understands how the principles of mathematics and physics are applied to model environmental processes, such as energy flow, material cycles, and mass and energy balances in ecosystems. The student has knowledge of the use of chemistry and biology to analyze biogeochemical processes, biogeochemical cycles, and the impact of human activity on the environment. The student is familiar with the theoretical foundations of interdisciplinary approaches to environmental protection, such as ecology, impact analysis, and sustainable development.	[SW2] presentation/project/paper/ report
[OŚL3_U07] Uses basic laboratory techniques, conducts field research and performs qualitative and quantitative analyses and draws conclusions on this basis for practical purposes.	The student conducts experiments according to the developed methodology, using appropriate measurement techniques and controlling experimental variables. The student analyzes experimental results, including the interpretation of measurement errors, and draws conclusions based on them.	[SU3] text preparation/written work

Course outcome	Subject outcome	Method of verification
[OŚL3_W11] Discusses measurement systems and analysis techniques used in monitoring the state of the natural environment.	The student understands the principles of operation of measuring devices, technologies, and methods used to monitor the quality of water, air, soil, and other elements of the natural environment.	[SW2] presentation/project/paper/ report
[OŚL3_K05] Identifies the level of her/his knowledge and skills, demonstrates the need to update knowledge about the environment and its protection, demonstrates the need for continuous professional training and personal development.	The student is familiar with methods for assessing the level of their knowledge and skills in environmental protection, and is able to identify areas where it requires expansion or updating. The student understands the importance of staying current with new scientific and technological achievements, as well as legal regulations related to environmental protection. The student knows the sources of information and tools that allow them to update their knowledge in the field of environmental protection, such as specialized literature, databases, courses, and training.	[SK3] text preparation/written work
[OŚL3_W08] Explains the mechanisms of economic and consumer pressure on the environment and recognises the possibilities of reducing it using the latest knowledge and scientific achievements.	The student understands the advanced mechanisms behind economic and consumption pressures on the environment, including processes related to the production, distribution, and consumption of natural resources. The student has knowledge of the impact of economic activities on various aspects of the environment, such as climate change, loss of biodiversity, air, water, and soil pollution, and the over-exploitation of resources.	[SW4] test/exam - oral or written
[OŚL3_U01] Performs tasks under supervision and independently in the field of analysis of the natural environment and the functioning of natural and man-made natural systems.	The student can independently analyze the natural environment, considering various factors such as climate change, human activity, and natural processes.	[SU3] text preparation/written work
[OŚL3_U02] Plans, selects appropriate research and measuring equipment and devices, performs physicochemical measurements and experiments; analyses the results and draws conclusions based on them.	The student is able to select appropriate apparatus and devices for conducting physico-chemical measurements, considering the specifics of the experiment and methodological requirements. The student is able to perform physico-chemical measurements, ensuring precision and accuracy of the results, while also controlling external factors that may affect the outcome of the experiment.	[SU4] test/exam - oral or written

Subject contents	**Introduction to Laboratory Exercise Topics in Environmental Analysis**: The Importance of Abiotic Factors in Environmental Assessments; Examples of Factors: Temperature, Humidity, pH, Chemical Composition of Soil and Water, Solar Radiation. **Temperature Measurement**: Methods of measuring temperature in different environments (water, soil, air); the impact of temperature on ecosystems and biological processes. **Humidity Analysis**: Methods of measuring humidity in soil and air; the importance of humidity in ecosystems and its impact on organisms. **pH Measurement**: Techniques for measuring pH in water and soil samples; the importance of pH for ecosystem health and its effect on biodiversity. **Chemical Composition of Soil and Water**: Methods of chemical analysis of soil, such as determining nutrient content and heavy metal ion levels; chemical analysis of water, including concentrations of ions, inorganic or organic substances, and selected pollutants. **Solar Radiation Measurement**: Methods of measuring solar radiation intensity; the impact of solar radiation on aquatic and terrestrial ecosystems. **Practical Applications (Field Exercises)**: Conducting field measurements and analyzing the collected data; examples of applying measurements such as pH and temperature in environmental monitoring. **Interactions Between Abiotic Environmental Factors**: Determining how different abiotic factors influence one another; case studies where these interactions are crucial for understanding ecosystems. **Data Processing and Discussion**: Methods of analyzing and interpreting data collected during measurements; creating reports with results from environmental studies; discussion of results obtained during laboratory exercises, combined with a discussion on the impact of the studied factors on the environment and the importance of monitoring them.
Prerequisites and co-requisites	
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Student activity (10%)	10.0%	10.0%
Post-Lab Report (30%)	30.0%	30.0%
Pre-Lab tests (60%)	60.0%	60.0%

Recommended reading	Basic literature
	• A. Mackenzie, A. S. Ball, S. R. Virdee, *Ekologia. Serie Krótkie wykłady*, Wyd. Naukowe PWN, Warszawa, 2000. • J. Weier, *Życie i ewolucja biosfery*, Wyd. Naukowe PWN, Warszawa, 2012. • B. Dobrzańska, G. Dobrzański, D. Kiełczewski, *Ochrona środowiska przyrodniczego*, Wyd. Naukowe PWN, Warszawa, 2008. • W. Chełmicki, *Woda. Zasoby, degradacja, ochrona*, Wyd. Naukowe PWN, Warszawa, 2007. • *Badania świadomości ekologicznej Polaków*, różne opracowania zlecone przez MŚ, 2009-2013 (http://www.mos.gov.pl/edu/). • S. Kozłowski, *Przyszłość ekorozwoju*, Wyd. KUL, Lublin, 2007. • W. Godlewska-Lipowa, J. Ostrowski, *Problemy współczesnej cywilizacji i ekologii*, Wyd. Uniw. Olsztyńskiego, Olsztyn, 2007.
	Supplementary literature: not applicable
	eResources addresses:

Example issues/ example questions/ tasks being completed	What factors are crucial in environmental analyses? Provide examples of such factors. How can changes in temperature, humidity, pH, chemical composition of soil and water, and solar radiation affect the functioning of ecosystems? Why is monitoring abiotic factors important in environmental research? What are the methods of measuring temperature in different environments, such as water, soil, and air? What is the significance of temperature for ecosystems? Provide examples of how temperature changes affect biological processes in ecosystems. What devices are most commonly used to measure temperature in laboratories and in the field? What methods are used to measure humidity in soil and air? Why is humidity an important factor in ecosystems? How does humidity affect plants and animals? What techniques can be used to determine the optimal humidity level for different organisms? What pH measurement techniques are used for water and soil samples? How does pH affect the health of ecosystems? Provide examples of how pH impacts biodiversity. What pH changes can occur due to human activities, and what consequences might they have for the environment? What methods of soil chemical analysis are most commonly used to determine nutrient content and heavy metal ions? What techniques are used for chemical analysis of water? What substances should be tested to assess water quality? What chemical pollutants are most commonly found in water and soil, and what impact do they have on the environment? What methods are used to measure solar radiation intensity? How does solar radiation affect aquatic and terrestrial ecosystems? What is the significance of changes in solar radiation intensity for the health of ecosystems? What measurements should be taken in the field to monitor the state of the environment? List examples of measurements such as pH, temperature, humidity. What tools and techniques are used to collect field data? How would you analyze the results collected in the field, and what conclusions can be drawn based on these data? How do different abiotic factors, such as temperature, humidity, pH, and solar radiation, influence each other? Provide examples of cases where the interactions of these factors are crucial for the functioning of an ecosystem. How can understanding the interactions between abiotic factors help predict changes in ecosystems?
Work placement	Field exercises

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