



## Subject card

Subject name and code	MONITORING AND ANALYTICS OF ENVIRONMENTAL POLLUTANTS, PG_00048657						
Field of study	Green Technologies						
Date of commencement of studies	February 2024		Academic year of realisation of subject		2024/2025		
Education level	second-cycle studies		Subject group		Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		English		
Semester of study	2		ECTS credits		6.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Marek Tobiszewski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	45.0	0.0	15.0	75
	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	75		5.0		70.0	150
Subject objectives	Aim of the subject is familiarization with the basic ideas of monitoring and environmental analytics.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U04] can be used to formulate and solve engineering tasks analytical methods, simulation and experimental, can make a critical analysis of the methods of operation and evaluate the existing technical solutions, in particular equipment, facilities, systems, processes, services in the field of environmental technology and make a preliminary economic analysis of engineering activities undertaken	is able to apply analytical procedures	
	[K7_W03] will have a detailed knowledge of the theoretical basis of methods and types of apparatus used in chemical analysis of environmental pollutants and the technology of cleaning and neutralization of industrial waste and wastewater management and the design and supervision of environmentally friendly technologies	knowledge on environmental monitoring	
	[K7_K03] can consciously and supported by the experience to present your work, provide information in a manner commonly understood, to communicate, to make self-assessment and constructive criticism of the work of others, the reasons for different points of view	is able to use different sources of knowledge	
	[K7_W04] is aware of the importance of environmental protection and has a detailed knowledge of chemical and biological threats to the environment, with particular emphasis on anthropogenic factors	has knowledge from environmental monitoring and basic environmental chemistry knowledge	
Subject contents	Sources of information for analysis. Method of citation literature sources. Basic problems trace analysis. Range of concentrations of trace analysis. Separation and enrichment of trace elements. The general scheme of trace analysis. Developments in analytics and environmental monitoring. Analyst speciation. Bioanalytyka and biomonitoring. Methods of sampling and preparation of environmental samples for analysis. Issues of representativeness. Technology pre-enrichment and isolation of contaminants from water and air. Sampling device. Preparation of samples. Selected methods and techniques of determination of air pollution, water and soil. Techniques of the final determinations. Detectors. The development results. The problem of calibration of measuring instruments. Methods of preparation of reference mixtures. The aggregate indicators for assessing environmental pollution. Elimination of background constituents on the results of the determinations. Assess the usefulness of summary indicators of the degree of environmental contamination. Characteristics and evaluation of commercial apparatus for control of environmental pollution. Basic groups of chemical methods for determining water pollution and soil. Quality assurance and control results (QA / QC). Validation of analytical methodologies. Reference materials. Laboratory: Determination of organic and inorganic environmental contaminants (heavy metals, TOC, PAHs, pesticides, TBT) in different matrices (water, wastewater, food) with the most modern analytical methods (GC-MS, HPLC, GC-DAI-ECD, CI, izatochoforeza).		
Prerequisites and co-requisites	Knowledge of the theoretical foundations of instrumental techniques Knowledge of the course: Chemistry, Physical Chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		50.0%	30.0%
		60.0%	40.0%
	50.0%	30.0%	
Recommended reading	Basic literature	-	
	Supplementary literature	-	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		