



Subject card

Subject name and code	Monitoring and Analysis of Environmental Pollution, PG_00064304						
Field of study	MONITORING I ANALITYKA ZANIECZYSZCZEŃ ŚRODOWISKA						
Date of commencement of studies	February 2026		Academic year of realisation of subject		2026/2027		
Education level	second-cycle studies		Subject group		Optional subject group Specialty subject group 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		Polish		
Semester of study	2		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Marek Tobiszewski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	15.0	0.0	75
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=1872						
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		45.0	125
Subject objectives	The aim of the subject is getting knowledge from environmental and monitoring of environment and legislation. The aim is improvement of analytical laboratory practice.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_K01] critically evaluates the content of cognitive and practical problems		Angielski is able to use analytical techniques to determine typical environmental pollutants		[SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce		
	[K7_U02] carries out experiments using properly selected techniques and apparatus, taking advantage of new developments in technology and related fields		is able to use analytical techniques to determine typical environmental pollutants		[SU4] Ocena umiejętności korzystania z metod i narzędzi		
	[K7_U06] applies computer, statistical and specialised database methods to solve scientific and technological problems in technology and related fields		Angielski knows and understands the standards that determine the state of the environment		[SU2] Ocena umiejętności analizy informacji		
	[K7_W04] recognises scientific, technological, organisational and economic opportunities and constraints in technology and related fields		is able to select a standard procedure for a specific analytical problem		[SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym		

Subject contents	Course content – lecture Learning the problems of trace pollution analysis, priority pollutants, speciation analysis, green analytical chemistry, validation of analytical procedures, solving design tasks in the field of monitoring a selected environmental element, solving a problem related to environmental chemistry. Course content – laboratory Learning the collection techniques, preparation of environmental samples, the use of instrumental techniques for determining organic and inorganic environmental pollutants and the use of multivariate statistical analysis techniques in the interpretation of obtained results. Course content – project The aim of the project is to propose a methodological solution consisting in developing a monitoring plan for a selected environmental element, based on the relevant current legislation.		
Prerequisites and co-requisites	basic knowledge from environmental chemistry and analytical chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	mean from laboratory classes	50.0%	30.0%
	project	50.0%	20.0%
	examination	50.0%	50.0%
Recommended reading	Basic literature	Metody instrumentalne w kontroli zanieczyszczeń środowiska, praca zbiorowa pod red. J. Namieśnika, skrypt PG, Gdańsk 1992 Secondary effects and pollutants of the environment, J. Namieśnik, T. Górecki, W. Wardencki, B. Zygmunt, L. Torres, skrypt PG, Gdańsk 1993 Pobieranie próbek środowiskowych do analizy, J. Namieśnik, J. Łukasiak, Z. Jamróglewicz, PWN, Warszawa 1995 Fizykochemiczne metody kontroli zanieczyszczeń środowiska, praca zbiorowa pod red. J. Namieśnika i Z. Jamróglewicza, PWN, Warszawa 1998 Przygotowanie próbek środowiskowych do analizy, J. Namieśnik, Z. Jamróglewicz, M. Pilarczyk, L. Torres, WNT, Warszawa 2000 Pestycydy, występowanie, oznaczanie i unieszkodliwianie, praca zbiorowa pod red. M. Biziuka, WNT, Warszawa 2001 Kontrola i zapewnienie jakości wyników pomiarów analitycznych, praca zbiorowa pod red. P. Konieczki i J. Namieśnika, WNT, Warszawa 2007 Zarys ekotoksykologii, praca zbiorowa pod red. J. Namieśnika i J. Jaśkowskiego, EKO-Pharma, Gdańsk 1995	
	Supplementary literature	-	
	eResources addresses		

Example issues/
example questions/
tasks being completed

Goals of environmental monitoring. What environmental compartments are monitored?

Basic analytical metrological parameters.

Why extraction is performed before final determination?

What is the goal of environmental tracers application? Give examples of environmental tracers. What requirements should it meet?

What are processes that lead to loss of liquid sample representativeness. What are the measures to avoid them?

What is speciation analysis? Explain terms: group speciation, individual speciation, screening speciation and physical speciation. Give examples.

What are advantages of total parameters application over more traditional approach to monitoring?

What are advantages of biomonitoring over more traditional approach to monitoring?

What are the requirements for bioindicator organism? Give examples of such organisms

Suggest analytical technique that can be applied to determine benzene in water samples. Suggest appropriate sampling technique, sample preparation and final determination technique.

List 5 solventless sample preparation techniques and describe two of them.

Principles of dispersive liquid-liquid microextraction technique.

List the elements of quality assurance/quality control system.

Suggest analytical technique that can be applied to determine toluene in the air during this examination. Suggest appropriate sampling technique, sample preparation and final determination technique.

Freons physicochemical properties, areas of application, environmental concerns and their naming.

Burial sites genesis, environmental problems, remediation.

Characteristics of the sample collected for analysis.

What is environmental fate of contaminants? Explain: emission, imission and transboundary pollutants.

What are the modes of location of analytical device in relation to investigated object? Which mode is the most beneficial and why?

Characteristics of clean rooms.

Process of ultrapure water production.

What parameters are TEQ and TEF?

What is environmental specimen bank?

	Role and tasks of environmental specimen banks. Describe aspiration, sedimentation and isolation modes of samples collection. Give examples. What are total parameters. What are advantages of their application. Give examples. Ways of total hydrocarbons parameter determination in air samples. What is the principle of SYMBIO system operations? Pros and cons of SF₆ application as environmental tracer. Principle of emission measurement by environmental tracing method. Application of environmental tracers. Describe areas of application. What compounds are applied as environmental tracers? Give examples. Features of ideal environmental tracer. Explain terms: bioavailability, bioaccumulation, bioconcentration, biomagnification and biotransformation. What are the features of organism to be used in BEWS? Why toxicological tests should be introduced to environmental monitoring? What are the limitations of chemical monitoring? What is derivatization and what is its purpose? Factors influencing concentration of radon in habituated buildings. Describe SPME extraction. Factors influencing SPME extraction efficiency. Discuss stationary phases applied in SPME fibres. Discuss SPME sorbent selection process.
Practical activities within the subject	Not applicable

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