

1.	Field of study	Environmental Protection
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	first-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Environmental pollution analytics
Module code		1OS_23_63
Number of the ECTS credits		3
Language of instruction		
Purpose and description of the content of education		Głównym celem prowadzonych zajęć jest zapoznanie studentów z podstawowymi problemami związanymi z zanieczyszczeniem środowiska oraz właściwościami i rozprzestrzenieniem w środowisku typowych zanieczyszczeń nieorganicznych i organicznych. Zapoznanie studentów z podstawowymi technikami i metodami analizy zanieczyszczeń. Celem zajęć laboratoryjnych jest nabycie przez studentów umiejętności praktycznych ilościowego oznaczania wybranych związków. Zajęcia te mają także nauczyć studentów dokonywania właściwej interpretacji wyników i wyciągania wniosków oraz łączenia zdobytej wiedzy teoretycznej z praktycznymi umiejętnościami.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme		Level of competenc (scale 1-5)
1	Zna rolę i zadania współczesnej chemii oraz jej fundamentalne znaczenie w nauce o środowisku.	1OS_W01	3	
		1OS_W02	3	
2	Zna podstawowe problemy związane z zanieczyszczeniem środowiska.	1OS_W05	4	
		1OS_W06	5	
3	Widzi możliwość wykorzystania zdobytej wiedzy w pracy zawodowej.	1OS_U03	3	
4	Zna właściwości i rozprzestrzenienie typowych zanieczyszczeń nieorganicznych: związki siarki i azotu, ozon, metale ciężkie, glin, beryl, azbest, odpady promieniotwórcze.	1OS_W01	4	
		1OS_W05	4	
5	Zna właściwości i rozprzestrzenienie typowych zanieczyszczeń organicznych, między innymi takich jak: węglowodory, fenole, nitrozoaminy, halogenowęglowodory, związki fosforoorganiczne, rozpuszczalniki organiczne, pestycydy.	1OS_W01	4	
		1OS_W05	4	
6	Posiada podstawową wiedzę z zakresu analityki zanieczyszczeń środowiska oraz zna podstawowe techniki i metody analizy zanieczyszczeń środowiska.	1OS_U01	4	
		1OS_U02	3	

		1OS_W06	4
7	Potrafi określić rozprzestrzenienie zanieczyszczeń w wodzie, powietrzu i glebie z uwzględnieniem specyficznych właściwości każdego z tych środowisk. Dostrzega istniejące i potencjalne zagrożenia dla poszczególnych elementów środowiska.	1OS_W02 1OS_W05	3 4
8	Stosuje podstawowe techniki analityczne w pracy indywidualnej oraz zespołowej wykorzystywane w ochronie środowiska. Interpretuje obserwacje, wyniki pomiarów i na ich podstawie wyciąga poprawne wnioski. Potrafi opracować samodzielnie lub zespołowo sprawozdania z przeprowadzonych badań.	1OS_K01 1OS_K02 1OS_U04	3 3 4
9	Potrafi przeprowadzić oznaczenia wybranych zanieczyszczeń, dokonać interpretacji wyników i wyciągnąć wnioski. Łączy zdobytą wiedzę teoretyczną z praktycznymi umiejętnościami. Ma świadomość konieczności ciągłego podnoszenia kompetencji zawodowych.	1OS_U01 1OS_U02 1OS_U04	4 4 4

9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
a03	Lecture methods / expository methods	Description <i>a description of objects, phenomena, processes or people; it involves specifying the structure and characteristic features of the object, phenomenon, or process being described; it is usually accompanied by a demonstration of the described object or by its models, drawings, tables, charts, etc.; a description may take the form of an explanation, classification, justification or comparison</i>
a05	Lecture methods / expository methods	Explanation/clarification <i>explication involving the derivation of a predetermined theorem from other, already known ones, in the number of steps specified by the person teaching the course</i>
b01	Problem-solving methods	Problem-based lecture <i>an analysis of a selected scientific or practical problem accompanied by its assessment and an attempt to provide a solution to the issues presented in the lecture as well as the indication of the consequences of the proposed solution</i>
b02	Problem-solving methods	Lecture-discussion <i>transmission of content involving interaction with the lecture audience; discussion of lecture-related issues is one of its elements or constitutes its follow-up</i>
b04	Problem-solving methods	Activating method – discussion / debate <i>an exchange of views supported by substantive arguments leading to a clash of different views, a compromise or the identification of common positions; it proceeds according to previously agreed-upon rules regarding the time, manner and turn-taking as well as the principles of civil discourse; a discussion is not a competition but aims at finding the best solutions or presenting different points of view; its varieties include brainstorming, Oxford-style debate, panel discussion, decision tree, conference discussion; a debate is an orderly dispute between supporters and opponents of a viewpoint, usually specialists in the field or pre-selected representatives of a group dealing with a common problem</i>
b07	Problem-solving methods	Activating methods: a case study <i>a comprehensive description of a phenomenon connected with the selected discipline; reflecting the reality, presenting the 'what', 'where' and 'how' of the phenomenon, i.e., all of its key aspects to be discussed in class; used as a reproduction, presentation, discussion or diagnosis of factors that shape the phenomenon or interact with it; an in-depth qualitative analysis and evaluation of a selected phenomenon</i>

b08	Problem-solving methods	Activating method – peer learning <i>learning through the exchange of knowledge in a group/team/pair of students, i.e., in the so-called learning cell; a kind of mutual learning; an approach focused on student activity under the guidance of the person teaching the course; a learning situation where students with a similar level of experience learn from one another</i>
b09	Problem-solving methods	Activating method – flipped classroom <i>anticipatory learning; work in class is based on previously studied material indicated by the person teaching the course; preparation outside the classroom serves the purpose of getting familiar with the issues whose knowledge is necessary for participating in the in-class discussion and the training in the related practical skills; the activity is based on the work of students under the guidance of the person teaching the course</i>
c07	Demonstration methods	Screen presentation <i>a presentation of synthetic image content using computer graphics, e.g., a series of slides or other multimedia forms, usually accompanied by a commentary; typical components of a screen presentation include text organized into bulleted points, charts, images and animations, sometimes sound effects or music; a multimedia illustration of course content presented in the form of a projected image</i>
d02	Programmed learning methods	Working with a programmed textbook <i>working with a textbook containing instructional material covering part of or the entire curriculum of the module as well as a formula for studying the content; includes working with a subject textbook, an atlas, a catalogue, a problem book, etc.</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>
e01	Practical methods	Laboratory exercise / experiment <i>[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment</i>
e03	Practical methods	Creation/production – creative workshop <i>an activity involving creating/producing a work/artifact based on the individual, creative effort of the participant; the creative workshop is characterized by the presence and openness which make it possible to access the essence of the work/peculiarity of the artifact at every stage of its creation/production</i>
e05	Practical methods	Internship <i>including professional and individual training; gaining skills and experience in real-life conditions, e.g., in the environment, institution or workplace the student is preparing for by following a specific study programme; training in real working conditions</i>
e08	Practical methods	Practice-as-research <i>also conducted as fieldwork; an activity aimed at confronting the acquired theory with practice through its practical application; students situate themselves in the reality they observe, study and transform through the prism of the theory; the method of practical classes is dominated by the application of knowledge to solving practical tasks</i>
f01	Methods of self-learning	Self-education <i>a method which involves independent acquisition of knowledge, skills and social competences, extending their scope and quality; complementary to the learning process taking place in class; taking on the task of developing and adjusting qualifications on one's own; self-study</i>
f02	Methods of self-learning	Individual work with a text <i>searching for and acquiring new information using textbooks and other written sources (including their digital versions); searching for texts, selecting fragments for analysis/interpretation, using other texts to solve a problem related to the studied issue</i>
f03	Methods of self-learning	Conceptual work

		<i>a (mainly intellectual) activity carried out independently (or in a selected group) resulting in the creation of a concept, idea or project; creating a plan based on a vision; developing a general outline of a project; producing a simplified sketch of the variant versions of a procedure/product/work</i>
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10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
1	lecture	10	course work	1, 2, 3, 4, 5, 6, 7	a01, a03, a05, b01, b02, b04, c07
2	laboratory classes	20	course work	1, 2, 3, 4, 5, 6, 7, 8, 9	a05, b04, b07, b08, b09, d02, d03, e01, e03, e05, e08, f01, f02, f03

11. The student's work, apart from participation in classes, includes in particular:				
Code	Category	Name (description)		Is it part of the BUNA?
a01	Preparation for classes	Search for materials and review activities necessary for class participation <i>reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes</i>		Yes
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>		Yes
a03	Preparation for classes	Developing practical skills <i>activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)</i>		No
a04	Preparation for classes	Consulting materials complementary to those indicated in the syllabus <i>agreeing on materials complementary to those indicated in the syllabus, supporting the implementation of tasks resulting from or necessary for class participation</i>		Yes
b01	Consulting the curriculum and the organization of classes	Getting acquainted with the syllabus content <i>reading through the syllabus and getting acquainted with its content</i>		Yes
b02	Consulting the curriculum and the organization of classes	Verification / adjustment / discussion of syllabus provisions <i>consulting the content of the syllabus, possibly in the presence of the year tutor or members of the class group, and, if necessary, reassessing the provisions concerning special conditions for class participation, e.g., space and time requirements, technical and other requirements, including conditions for participation in classes outside the walls of the university, classes organized in blocks, organized online, etc.</i>		Yes
b03	Consulting the curriculum and the organization of classes	Consulting the schedule <i>getting acquainted with the class schedule, possibly in the presence of the year tutor, in order to optimize participation in classes, including those supplementary to the core subjects listed in the pursued study programme</i>		Yes
c01	Preparation for verification of learning outcomes	Determining the stages of task implementation contributing to the verification of learning outcomes <i>devising a task implementation strategy embracing the division of content, the range of activities, implementation time and/or the method(s) of obtaining the necessary materials and tools, etc.</i>		Yes

c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	Yes
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion <i>a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory phase/element of the verification of the learning outcomes assigned to the course</i>	Yes
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes
d02	Consulting the results of the verification of learning outcomes	Development of a corrective action plan as well as supplementary/corrective tasks <i>reviewing and selecting tasks and activities enabling the elimination of errors indicated by the academic teacher, their verification or correction resulting in completing the task with at least the minimum passing grade</i>	Yes
e01	Activities complementary to the classes	Undertaking, on one's own initiative and individually, activities aimed at expanding the scope or depth of the teaching content, also beyond the walls of the University <i>a set of activities undertaken independently and on the student's own initiative, aimed at expanding the depth and scope of knowledge and skills, their revision and repetition, retention or verification, also activities carried outside the university, e.g., in a culture promoting or educational institution, a laboratory, in the open air, etc.; also self-education</i>	No

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.