University of Gdańsk

Subject card

Subject name and code	Water analysis, PG_00033319						
Field of study	Chemistry, Environmental Protection						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2025/2026			
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	2		Language of instruction	Polish			
Semester of study	4		ECTS credits	1.0			
Learning profile	academic		Assessment form	credit			
Conducting unit	Laboratory of Advanced Oxidation Processes -> Department of General and Inorganic Chemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor	dr Aleksandra Bielicka-Giełdoń					
	Teachers	dr Aleksandra Bielicka-Giełdoń					
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		2.0	8.0	25	
Subject objectives	Familiarizing students with standardized water quality indicators and methods of measuring						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEML3_W05] Has basic knowledge of the chemical specialisation studied.	- the student lists the types of water pollution and the sources of their formation; - the student defines the parameters and describes the methods of their determination to assess the quality of water; - the student describes the principles of collecting and preparing water samples for physicochemical analysis; - the student refers to the applicable legal acts to assess the quality of water,	[SW4] test/exam - oral or written [SW2] presentation/project/paper/ report
[CHEML3_U02] Performs analyses using experimental methods and draws conclusions based on them.	- the student plans, performs and interprets basic physicochemical analyses of water samples; - the student conducts laboratory tests of water quality according to the instructions and prepares written reports on their implementation; - student uses analytical techniques, including UV-Vis spectroscopy, titration analysis, weight analysis, potentiometry; - student defines parameters and describe their determination methods for assessing water quality.	[SU2] presentation/project/paper/ report [SU5] implementation of a problem task [SU6] demonstration of practical skills
[CHEML3_U01] Identifies, analyses and solves problems in the field of broadly understood chemistry on the basis of the acquired knowledge.	- the student conducts laboratory tests of water quality according to the instructions and prepares written reports on their implementation; - the student follows the applicable rules when taking environmental samples for physicochemical analyses; - the student plans, performs and interprets basic physicochemical analyses of water samples; - the student applies applicable legal acts in the assessment of the quality of natural waters	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU6] demonstration of practical skills [SU8] observation of student's independent or team work
[CHEML3_W10] Enumerates and describes the basic aspects of the construction, operation and use of measuring apparatus and equipment used in experimental works in the field of chemistry and related sciences.	- the student describes the scheme of the analytical procedure and the sequence of analyses of individual water quality parameters. - student defines parameters and describe their determination methods for assessing water quality	[SW4] test/exam - oral or written [SW2] presentation/project/paper/ report
[CHEML3_U07] Prepares documented elaboration on a specific problem in the field of selected chemical and physical issues.	- the student conducts laboratory tests of water quality according to the instructions and prepares written reports on their implementation	[SU2] presentation/project/paper/ report
[CHEML3_U03] Selects the appropriate equipment and laboratory apparatus for conducting uncomplicated chemical experiments.	- the student plans, performs and interprets basic physicochemical analyses of water samples; - the student conducts laboratory tests of water quality according to the instructions and prepares written reports on their implementation; - student uses analytical techniques, including UV-Vis spectroscopy, titration analysis, weight analysis, potentiometry	[SU2] presentation/project/paper/ report [SU6] demonstration of practical skills [SU8] observation of student's independent or team work

<table>
<tr><td>Subject contents</td><td>A. Scope of Lecture

Water chemistry, the water cycle in nature, pollutants in natural waters, legal requirements for water quality according to intended use, physicochemical and sanitary control of water quality, water suitability for consumption and economic purposes, general classification of water quality, and industry standards for waters used in various industries. The Polish Committee for Standardization. Reference methods for water analysis. Normalized physicochemical and bacteriological indicators in water. Techniques used in water analysis. Analytical procedure diagram. Collection and preparation of water samples for physicochemical analysis: instruments for water sampling; sources of potential changes in the composition of the tested water sample; sources of errors related to the stage of water sampling and treatment; principles and methods for the preservation of water samples before further stages of the analytical process. Physical and organoleptic parameters of water: colour, smell, taste, turbidity, transparency, electrical conductivity, temperature. Physicochemical parameters: suspended solids, dry residue, dissolved substances, pH, water acidity, alkalinity of water, water hardness, aerobic parameters (dissolved oxygen/oxygen saturation degree, BOD_5, COD, Oxidation), the content of individual organic substances, content of nitrogen compounds (ammonium nitrogen, Kjeldahl nitrogen, nitrates, nitrites), phosphorus (phosphates, total phosphorus), content of metals and metalloids, content of inorganic anions, THM - trihalomethanes. Sequence of analyses of water quality parameters.

B. Scope of laboratory exercisesThe laboratory exercises include performing analyses of physico-chemical parameters of water, such as: Determination of total water hardness and calcium and magnesium content; Determination of nitrogen and phosphorus compounds. Organic pollutants in water. Determination of permanganate index; Determination of anionic surfactants by methylene index measurement, Quality assessment of self-sampled natural waters based on selected physico-chemical parameters.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>lecture: test, laboratories: points for tests and reports;</td><td>51.0%</td><td>100.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Teacher-developed materials for students</td></tr>
<tr><td>Supplementary literature</td><td>• Hermanowicz W., Fizyczno-chemiczne badanie wody i ścieków, Wydawnictwo Arkady, Warszawa 1999
• Dojlido J.R., Instrumentalne metody badania wody i ścieków, Wydawnictwo Arkady, Warszawa 1980
• Namieśnik J., Jamrógiewicz Z., Fizykochemiczne metody kontroli zanieczyszczeń Środowiska,
• Wydawnictwa Naukowo-Techniczne, Warsza wa 1998
• Kowal A.L., Świderska-Bróż M., Oczyszczanie wody, Wydawnictwo Naukowe PWN, Warszawa 2007</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table>
</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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