GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Analytical laboratory management, PG_00060781						
Field of study	Chemical Technology						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2027/2028			
Education level	first-cycle studies		Subject group	Optional 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	4		Language of instruction	Polish			
Semester of study	7		ECTS credits	4.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Piotr Konieczka				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	30.0	15.0	60
	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	60		10.0	50.0	120	
Subject objectives	Presentation of the basic requirements for the operation of an analytical laboratory, especially an accredited one.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K04] is able to think and act in an entrepreneurial way	The student demonstrates initiative and a proactive approach to problem solving and value creation. They are ready to take responsible risks and learn from successes and failures.	[SK1] Assessment of group work skills [SK3] Assessment of ability to organize work
[K6_U13] performs an initial economic evaluation of proposed solutions and engineering activities undertaken, is able to apply knowledge of the humanities or social sciences to solve problems	The student is able to conduct a preliminary economic analysis of proposed technological solutions, including cost identification, profitability estimation, and comparison of design options. The student is able to assess the effectiveness of engineering activities, taking into account technical, economic, and organizational criteria.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
[K6_U05] recognises and identifies the relationship between technological issues, implemented in industrial practice, and their impact on various elements of the environment, in the context of mechanisms and conditions of sustainable development, recognizes their systemic and non-technical aspects	The student is able to analyze the relationships between technological processes and their impact on the environment, taking into account emissions, resource consumption, and waste generation. They are able to identify and assess the impact of industrial activities on individual elements of the environment (air, water, soil, biodiversity) using basic environmental assessment methods.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
[K6_W05] has knowledge of chemical technology based on mineral or energy resources and modern energy sources, understands the concept of sustainable development, knows the principles of green chemistry and environmentally friendly process engineering, has knowledge of occupational safety in the chemical industry	The student knows the types and properties of mineral and energy resources used in chemical technology and their importance in industrial processes. They have knowledge of modern energy sources and their applications in the chemical industry. They understand the concept of sustainable development and its importance for the design and operation of production processes.	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture
Description of the basic requirements for the operation of an analytical laboratory accredited in accordance with the requirements of ISO 17025. Focus on those aspects of laboratory work that are required by external auditors and concern document circulation, report preparation, internal laboratory quality control, supervision of laboratory equipment, and validation of analytical procedures used.

Course content – project
From among the proposed topics related to the supervision of work in a specific analytical laboratory (medical, food, industrial, cosmetic, environmental), students will choose a given area
- The students' task is to propose a plan for supervising the work of an analytical laboratory - specifying both the method of planning the work and its control.
- The final result of the project will be a report describing the action plan of the selected analytical laboratory in order to obtain/maintain accreditation in accordance with PCA guidelines and recommendations.

Course content – seminar
Presentation of basic statistical tools (control charts, statistical tests, use of reference materials and proficiency testing results) for managing and controlling the quality of laboratory work. Students will perform the relevant calculations using Excel.

Prerequisites and co-requisites

Subject knowledge: Laboratory techniques, Analytical chemistry, Inorganic chemistry, Physical chemistry, Instrumental analysis, Fundamentals of chemical metrology

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
seminar	60.0%	20.0%
project	60.0%	60.0%
lecture	60.0%	20.0%

Recommended reading

Basic literature

1. Hering B., **Zarządzanie jakością w laboratorium analitycznym**, Wydawnictwo Naukowe PWN, Warszawa.
2. Ellison A., Williams A. (red.), **Quantifying Uncertainty in Analytical Measurement**, Eurachem Guide.
3. Skoog D.A., West D.M., Holler F.J., Crouch S.R., **Principles of Instrumental Analysis**, Cengage Learning.
4. Kellner R. i in., **Analytical Chemistry: A Modern Approach to Analytical Science**, Wiley-VCH.
5. Mocak J., **Walidacja metod analitycznych**, Wydawnictwo Uniwersytetu Komenskiego / materiały Eurachem.
6. **PN-EN ISO/IEC 17025**: *Ogólne wymagania dotyczące kompetencji laboratoriów badawczych i wzorcujących*, Polski Komitet Normalizacyjny.

	Supplementary literature	1. Thompson M., Ellison S.L.R., Wood R., **Guide to Quality in Analytical Chemistry**, Eurachem/CITAC Guide. 2. Lane R.D., **Laboratory Management: Principles and Processes**, CRC Press. 3. Meyer W., **Przewodnik po metrologii chemicznej**, GUM / materiały metrologiczne. 4. Materiały i przewodniki **Polskiego Centrum Akredytacji (PCA)** dotyczące akredytacji laboratoriów.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. The role and organization of an analytical laboratory structure, functions, tasks, types of laboratories. 2. Quality management systems in laboratories PN-EN ISO/IEC 17025 requirements, quality documentation, quality policy. 3. Validation of analytical methods validation parameters, procedures, validation documentation. 4. Quality control and quality assurance (QC/QA) reference materials, control samples, calibration curves, control charts. 5. Chemical metrology and measurement uncertainty calculation basics, uncertainty budget, interpretation of results. 6. Laboratory resource management apparatus, reagents, auxiliary equipment, calibration and standardization. 7. Laboratory work planning schedules, task allocation, priorities, optimization of analytical processes. 8. Internal and external audits types of audits, preparation, conduct, and reporting. 9. Occupational health and safety in the laboratory risk assessment, safety procedures, chemical waste, emergency situations.	
Practical activites within the subject	Not applicable	

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