GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	General and inorganic chemistry , PG_00063390		
Field of study	Technologies for Industry 5.0		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	Obligatory subject group 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	1	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Chemistry and Technology of Functional Materials -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Ewa Wagner-Wysiecka	
	Teachers	dr inż. Radosław Pomećko dr hab. inż. Ewa Wagner-Wysiecka	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	0.0	0.0	45
	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	45	5.0	50.0	100

Subject objectives

The aim of the course is to provide knowledge of general and inorganic chemistry in connection with technologies used in industry, in particular those important for information technology. Selected issues of experimental planning and optimisation of modern technological processes will also be presented using selected examples.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U01] applies knowledge of mathematics, physics, chemistry, IT tools and other engineering disciplines to solve theoretical, engineering and technological problems	Student can write and balance chemical equations, can perform basic chemical calculations, can critically evaluate the obtained results and estimate their uncertainty	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
[K6_W01] demonstrates knowledge and understanding of mathematics, physics, chemistry and IT tools at the level necessary to formulate and solve typical engineering and technological problems	Student knows the basic groups of chemical compounds, understands the relationship between the structure and properties of chemical compounds, describes their properties, knows the basic types of chemical reactions, lists the basic technologies crucial for the development of information technology and other branches of technology	[SW1] Assessment of factual knowledge

Subject contents	**Lecture** 1) Periodic table of elements (2h). 2) Basic chemical laws and concepts (1h). 3) Chemical bonding in classical description and quantum mechanics (3h). 4) Types of chemical reactions, redox reactions, coordination compounds formation (2h). 5) Theories of acids and bases (1h). 6) Fundamentals of thermodynamics and chemical kinetics; industrial aspects (3h). 7) Physicochemical properties of solutions. Water in industry. (2h). 8) Elements of electrochemistry (cells, electrolysis, corrosion, electroplating) (2h). 9) Introduction to industrial technologies, issues of process optimisation, contemporary technologies and sustainable development; computerisation and automation, intelligent infrastructure in the chemical industry (2h). 10) Selected s block elements. Alkali and alkaline earth metals - their properties, compounds, production and application in energy storage and conversion technologies (2h). 11) Selected p block elements: 13 group of elements - their properties, compounds, obtaining and application including: aluminium, production, application, recycling (2h). 12) Selected p block elements: 14 group of elements - their properties, compounds, obtaining and application in semiconductor technologies (2h). 13) Selected p block elements: 15 group of elements - their properties, compounds, obtaining and application of selected technologies, with special emphasis on bismuth (2h). 14) Selected p block elements: 16 group of elements - their properties, compounds, obtaining and application in technology and industry (1h). 15) Selected p block elements: 17 group of elements (halogens) - their properties, compounds, obtaining and application in technology and industry (1h). 16) Selected d block elements - their properties, compounds, obtaining and application in high-tech technologies (2h). **Exercises** 1) Planning an experiment (2h). 2) Measurement and estimation of experimental uncertainty (1h). 3) Statistical methods in the analysis of experimental results (2h). 4) Basic chemical laws, abundance of matter (1h). 5) Solutions - methods of expressing concentrations (1h). 6) Colloquium (1h). 7) Equilibria in electrolyte solutions (dissociation, strong and weak electrolytes, degree and constant of dissociation) (2h). 8) Aqueous solutions, pH. Buffer solutions (2h). 9) Electrochemical calculations (cells, electrolysis, Faraday's law) (1h). 10) Energy effects of physical processes and chemical reactions. Thermochemical calculations (1h). 11) Colloquium (1h)
Prerequisites and co-requisites	Basic knowledge of mathematics, physics and chemistry required.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Two colloquia from exercises	51.0%	40.0%
Written exam	51.0%	60.0%

Recommended reading	Basic literature	Bielański A. , Podstawy chemii nieorganicznej (t.1 oraz t.2), Wydawnictwo Naukowe PWN, Warszawa 2024 Cox P.A., Krótkie wykłady: chemia nieorganiczna. Wydawnictwo Naukowe PWN, Warszawa 2024 Jones Loretta, Atkins Peter, Leroy Laverman, Chemia ogólna. Wydawnictwo Naukowe PWN, Warszawa 2020. Bobryk Ewa, Schmidt-Szałowski Krzysztof, Sentek Jan, Szafran Mikołaj, Technologia chemiczna. Przemysł nieorganiczny. Wydawnictwo Naukowe PWN, Warszawa 2023 Bortel Edward, Konieczny Henryk, Zarys technologii chemicznej, Wydawnictwo Naukowe PWN, Warszawa 1992. Piotrowski Jerzy, Szarawara Józef, Podstawy teoretyczne technologii chemicznej. Wydawnictwa Naukowo-Techniczne, Warszawa, 2020. M. Korzyński, "Metodyka eksperymentu ,Planowanie, realizacja i statystyczne opracowanie wyników eksperymentów technologicznych", Wydawnictwo Naukowe PWN, Warszawa 2021 Rola-Noworyta Anna, Pazdro Krzysztof, Akademicki zbiór zadań z chemii ogólnej. Oficyna Wydawnicza Krzysztof Pazdro, 2015 Okuniewski Andrzej, Chemia Ogólna i Nieorganiczna Ćwiczenia Rachunkowe. Wydawnictwo Politechniki Gdańskiej, 2021. Konieczka Piotr, Namieśnik Jacek, Ocena i kontrola jakości wyników pomiarów analitycznych. Wydawnictwo Naukowe PWN, Warszawa 2017.
	Supplementary literature	D. C. Montgomery, "Design and Analysis of Experiment", John Wiley & Sons Inc., 2013 Krawczyk Krzysztof, Petryk Jan, Schmidt-Szałowski Krzysztof, Technologia chemiczna. Ćwiczenia rachunkowe. Wydawnictwo Naukowe PWN, Warszawa 2021 Grzywa Edward, Molenda Jacek, Technologia podstawowych syntez organicznych (t.1 oraz t.2). Wydawnictwa Naukowo-Techniczne, Warszawa, 2016. Jess Andreas, Wasserscheid Peter, Chemical Technology - from principles to products. Wiley-VCH Verlag GmbH, 2020.
	eResources addresses	Adresy na platformie eNauczanie: Chemia ogólna i nieorganiczna 2024_2025 - Moodle ID: 41243 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=41243 Chemia ogólna i nieorganiczna 2024_2025_cwiczenia - Moodle ID: 41245 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=41245

Example issues/ example questions/ tasks being completed	Explain the relationship between the properties of chemical elements and their position in the periodic table of elements (periodicity law) Give examples of elements and their industrial technologies related to the development of information technology Calculate the pH of an aqueous solution (strong and weak acids and bases) Planning an experiment: stages and their verification
Work placement	Not applicable

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