GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Inorganic chemistry, PG_00057549						
Field of study	Green Technologies						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2026/2027			
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	2		ECTS credits	7.0			
Learning profile	general academic profile		Assessment form	exam			
Conducting unit	Department of Inorganic Chemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Agnieszka Pladzyk				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	45.0	0.0	0.0	90
	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	90		10.0	75.0	175	
Subject objectives	The course aims to provide students with an understanding of key issues in inorganic chemistry, enabling them to comprehend phenomena occurring in nature and to independently plan research work in this area.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] has a basic knowledge of chemistry including general chemistry, inorganic, organic, physical, analytical, including the knowledge necessary to describe and understand the phenomena and chemical processes occurring in the environment; measurement and the determination of the parameters of these processes.	The student has knowledge of chemistry including general and inorganic chemistry, with the necessary knowledge to describe and understand chemical phenomena and processes occurring in aqueous solutions, determine the parameters of these processes. The student describes the properties of basic chemical compounds, their occurrence and functions in living organisms and the environment.	[SW1] Assessment of factual knowledge
[K6_K01] understands the need for learning throughout life, can inspire and organize the learning process of others. Is aware of his/her own limitations and knows when to ask the experts, can properly identify priorities for implementation, critically evaluate his knowledge	The student understands the need and necessity of continuous improvement of his/her knowledge, is able to plan the sequence of actions enabling the completion of a given task.	[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice [SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work
[K6_U05] can formulate and solve engineering tasks analytical methods, simulation as well as experimental, able to apply knowledge of basic physics and mathematics to analyze the results of experiments, is able to analyze and assess existing technical solutions	Student is able to use properly selected analytical, simulation and experimental methods and devices enabling basic measurement of quantities characterizing chemical substances and processes occurring in aqueous solutions	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject
[K6_U01] is able to obtain information from literature, databases and other sources, is able to integrate the information obtained, to make their interpretation, as well as draw conclusions and formulate and justify opinions, take part in the discussion	The student is able to select appropriate data from the literature to carry out basic chemical calculations, determine the course of reactions occurring in aqueous solutions, as well as analyze the obtained results, calculations and verify their correctness..	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment

Subject contents

Course content – lecture
LECTURE:

- Types of inorganic reactions: redox reactions, proton transfer (acid-base equilibria), ligand transfer (precipitation reactions, complexation reactions).
- Equilibria in electrolyte solutions (acids, bases, buffers, hydrolysis of salts).
- Review of the basic classes of compounds of the s, p and d binary elements of the periodic table
- Essential trace and ultra trace elements, bio-molecules, metalloproteins-selected examples.

Course content – exercises

TUTORIALS - practical calculation activities:

- Equilibria in aqueous electrolyte solutions. Ion concentrations and pH of solutions of weak and strong acids and bases. The effect of a common ion.
- Buffer solutions. Hydrolysis of salts. Solubility and solubility product. Equilibria in solutions of complex compounds.

Course content – laboratory

LABORATORY - practical classes.
Classical qualitative analysis course. 9 exercises including:

- analysis of aqueous solutions of selected cations and anions,
- analysis of inorganic substances: metal, non-metal, oxide, acid, base, salt,
- study of the properties of buffer solutions and aqueous solutions of inorganic salts.

Prerequisites and co-requisites

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Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
laboratory - test and reports	45.0%	25.0%
tutorials - 2 tests	60.0%	25.0%
lecture - exam	60.0%	50.0%

Recommended reading	Basic literature	• A. Bielański Chemia nieorganiczna, PWN wydania z ostatnich lat; • P.A. Cox Krótkie wykłady, chemia nieorganiczna, PWN 2003; • L. Jones, P. Atkins, L. Leroy, Chemia ogólna, Wydawnictwo naukowe PWN 2020, wydanie II; • Skrypty uczelniane: J. Prejzner: Chemia nieorganiczna. Laboratorium Wydawnictwo PG, Gdańsk 2004. • Chemia ogólna i nieorganiczna ćwiczenia rachunkowe Praca zbiorowa pod redakcją A. Okuniewskiego, Wydawnictwo PG, Gdańsk. (2019)
	Supplementary literature	• N.N. Greenwood, A. Earnshaw Chemistry of the elements Pergamon, wyd. II (2005); • C.E. Housecroft, A.G. Sharpe Inorganic chemistry, Pearson, Prentice Hall; wyd I (2001), II (2005) lub III (2008);
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Write the dissociation equations of orthophosphoric(V) and orthoboric(III) acid. In each equation, indicate the acid and base according to Brønsted or Lewis theory. 2. Describe the industrial method for obtaining nitric acid. 3. Describe the industrial method for obtaining ammonia. 4. Describe the industrial method of obtaining sulfuric(VI) acid. 5. Describe the industrial method for obtaining sodium carbonate. 6. Describe the industrial method for obtaining sodium hydroxide. 7. Nitrate and phosphate fertilizers - obtaining, properties and effects on living matter and the environment. 8. Determine the dissociation constant of acetic acid 9. Calculate the pH of the solution formed by mixing equal volumes of aqueous solutions of ammonia and concentration of 0.3 M and formic acid with concentration of 0.15M 10. Give examples of the use of d-block elements 11. Give examples of the occurrence of elements with important functions in proteins. 12. What interactions are crucial to the activity of biological systems, such as proteins	
Practical activites within the subject	Not applicable	

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