



Subject card

Subject name and code	Inorganic chemistry, PG_00057549						
Field of study	Green Technologies						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
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						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Agnieszka Pladzyk					
	Teachers	dr inż. Daria Kowalkowska-Zedler dr inż. Anna Ordyszewska dr hab. inż. Agnieszka Pladzyk					
Lesson types and methods of instruction	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	Through lectures, exercises and laboratories, cause the student to understand and use basic concepts of inorganic chemistry.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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	Student is able to select appropriate data from the literature in order to carry out basic calculations concerning reactions in aqueous solutions, is also able to analyse the obtained calculation results and verify their correctness.	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
	[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 general and inorganic chemistry, including knowledge necessary for description and understanding phenomena and chemical processes occurring in aqueous solutions, determining the parameters of these processes. Student gives a short description of noble gases and their compounds. Describes the natural resources, preparation and properties of halogens. Describes the natural resources, preparation and properties of the 16th and 15th groups elements, with a special emphasis on sulfur, nitrogen and phosphorus. Gives a description of 14th group elements - describes the allotropes of carbon and its inorganic compounds, properties of silicon, silica, silicates and silicones. Defines the concept of metal. Describes metals of p, s block. Gives a definition of a coordination compound. Student names the trace and ultratrace elements in living organisms and gives representative examples of biomolecules bearing metallic centers. Student is able to do calculations covering the subject of chemical equilibrium. He can explain the common ion effect, calculate buffer solutions and apply the hydrolysis concept. He also can solve the problems regarding solubility, solubility product and equilibria in aqueous solutions of coordination compounds.	[SW1] Assessment of factual knowledge
	[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 materials 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_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
Subject contents	LECTURE: Types of inorganic reactions: transfer of electro, transfer of proton, ligand exchange. Noble gases, halogens. Elements of 16 and 15 groups with emphasis on sulfur, nitrogen and phosphorus. The chemistry of group 14 elements - inorganic compounds of carbon; silicon, silica, silicates and silicones. Boron and its compounds. Metals - an introduction. metals of p block. Metals of s block. Coordination compounds. Essential trace and ultratrace elements, biomolecules with metallic centres - selected examples. EXERCISES: Equilibria in the aqueous solutions of electrolytes. Common ion effect. Buffers and hydrolysis of salts. Solubility and solubility product. Equilibria in solutions of complexes. LABORATORY: The program of the laboratory includes 10 exercises concerning qualitative analysis of cations and anions. These exercises are performed individually. Every student must write short entrance test and write the report after each exercise.		

Prerequisites and co-requisites	1st semester of Inorganic Chemistry passed		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	laboratory	45.0%	25.0%
	lecture	60.0%	50.0%
	tutorials	60.0%	25.0%
Recommended reading	Basic literature	Required reading 1. L. Jones, P. W. Atkins "General Chemistry" 2. J. Chojnacki, A. Dołęga, B. Dręczewski "Selected Topics in General and Inorganic Chemistry" Wyd. PG 2013. 3. J. Chojnacki, A. Dołęga, S. Konieczny, A. Konitz, A. Okuniewski (red.), J. Pikies, A. Pladzyk, Ł. Ponikiewski, M. Walewski, A. Wiśniewska: Chemia ogólna i nieorganiczna. Ćwiczenia rachunkowe. <i>Wydawnictwo Politechniki Gdańskiej</i> , Gdańsk 2019. ISBN: 978-83-7348-795-6 .	
	Supplementary literature	Recommended reading 1. P. A Cox, "Instant Notes in Inorganic Chemistry" BIOS 2000. 2. MIT Open Courses in Chemistry 3. T. L. Brown, H. LeMay, B. Bursten, "Chemistry. The Central Science" Prentice Hall, 2000.	
	eResources addresses	Adresy na platformie eNauczanie: Chemia nieorganiczna BT & ZT 2 semestr 2023/2024 - Moodle ID: 37243 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37243	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Compare the strength of the chlorine oxygen acids 2. Describe the steps in the synthesis of ammonia by the Haber-Bosch method 3. Describe the steps in the synthesis of sulfuric acid (VI) 4. Compare the strength of acids (H₂O, H₂S, H₂Se, H₂Te) 5. Compare ammonia combustion products without catalyst and with ruthenium catalyst. Write down the reaction equations. 6. Draw the Lewis formulas of the carbonate anion and the sulfate (IV) ion and compare their spatial structure using the VSEPR method 7. Describe the products of combustion of alkali metals in oxygen. Write down the reaction equations. 8. Describe the steps in the production of aluminum from bauxite - the Bayer process and the Hall-Heroult process 		
Work placement	Not applicable		