GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Inorganic chemistry, PG_00057746		
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	English
Semester of study	1	ECTS credits	5.0
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	30.0	0.0	0.0	0.0	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	80.0	150

Subject objectives

The aim of the course is to teach Green Technologies students the broad fundamentals of chemistry, covering key issues related to the structure of matter, the properties of elements and their compounds, chemical reactions, and the basics of thermodynamics.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 apply the knowledge in the field of inorganic chemistry together with the laws describing the foundations of physics and mathematics in the analysis of the results of conducted experiments.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
[K6_W01] has a basic knowledge from some branches of mathematics and physics useful for formulating and solving simple problems in the field of environmental technologies and modern analytical methods	The student has a basic knowledge of mathematics and physics, needed in solving problems concerning technological processes and analytical methods related to the environment and its protection.	[SW1] Assessment of factual knowledge
[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.	Student can invoke and apply the basic chemical laws and definitions of general, inorganic, physical, organic and analytical chemistry useful in analysis of chemical processes occuring in the environment.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture

Lecture

1. Basic chemical concepts and laws. Atoms and molecules. Mole. Atomic, molar and molecular mass. Chemical compounds and mixtures. Solutions. Ways of expressing composition and concentration
2. Chemical reactions, equations, types of chemical reactions. Stoichiometry of chemical reactions, nomenclature of chemical compounds.
3. Electronic structure of the atom and the periodic table: Atomic orbitals. Electron configurations of atoms. Periodic table. Periodicity of properties. Ionization potentials. Electronegativity. Electron affinity.
4. Chemical bonds, structure of chemical compounds, properties of chemical compounds. OM theory, symmetry and types of molecular orbitals (LCAO). Orbital hybridization and molecular geometry. VSEPR method.
5. Hydrogen. Characteristics and types of hydrides. Water, its physical and chemical properties. Association and dissociation of water. Structure of ice crystals. Hydrogen peroxide. Peroxides and suboxides. Peroxy acids. Oxygen and its compounds.
6. Arrhenius, Brønsted, and Lewis theories of acids and bases.

Course content – exercises
Tutorials

Basic chemical concepts and laws: Chemical substances, elements, and compounds. Law of conservation of mass. Law of definite proportions and multiple proportions. Law of simple volume ratios. Atom and molecule. Mole. Atomic, molar, and molecular mass. Determining the empirical formula and molecular formula. Gas laws. Equation of state of an ideal gas. Isothermal, isobaric, and isochoric transformations. Chemical compound and mixture. Solutions. Ways of expressing composition and concentration: percentage composition, mole fraction, concentration. Stoichiometry and reactions. Nomenclature of selected groups of organic compounds. Types of chemical reactions: synthesis, analysis, and exchange. Combustion reaction. Reactions occurring in solutions and precipitation reactions. Acids and bases. Oxidation and reduction reactions. Selection of coefficients.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
lecture: written exam	60.0%	60.0%
tutorials:three written tests	60.0%	40.0%

Recommended reading

Basic literature	1. P. Atkins, L. Jones, L. Laverman: Chemical Principles. The Quest for Insight. W. H. Freeman; 7 edition 2016. 2. R. Chang: General Chemistry. The Essential Concepts. 5th Edition. McGraw-Hill Companies, New York 2008
Supplementary literature	1. Atkins P.: Podstawy chemii fizycznej. PWN, Warszawa, 2009 2. Sienko M., Plane R.: Chemia. Podstawy zastosowania. PWN,Warszawa,1993. 3. Pajdowski L.: Chemia ogólna. PWN, Warszawa,1999.
eResources addresses	

Example issues/ example questions/ tasks being completed

1. Physical and chemical properties of metals
2. Methods of obtaining hydrogen
3. Write down the electron configuration of Al and Al^{3+}
4. Calculate the number of oxygen atoms present in 3 g of water
5. Descrbe intermolecular forces
6. Give the examples of acids and bases according to the Brönsted-Lowry theory
7. What is the geometry and shape of the molecule of ammonia, carbon dioxide and sulphate(VI) ion
8. What volume occupy by 2 g of molecular hydrogen under normal conditions?

Practical activites within the subject

Not applicable

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