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 2025	Academic year of realisation of subject	2025/2026
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 -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Agnieszka Pladzyk	
	Teachers		

Lesson types and methods of instruction

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 students the direction of Green Technologies&Monitoring of the broadly understood basis of chemistry.

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.	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.	[SW3] Assessment of knowledge contained in written work and projects [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 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.	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
[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

Subject contents

Lecture
1. Basic concepts and chemical laws: What is chemistry? Chemical substance, elements and chemical compounds. Atom and molecule. Mole. Atomic mass. Molecular atomic and molecular mass. Law of conservation of mass and energy. The law of fixed and multiple relations. The law of simple volumetric relations. Chemical compound and mixture. Solutions. Ways of expressing composition and concentration.
2. Chemical reactions: Chemical equations. Types of chemical reactions: synthesis, analysis, and exchange. Combustion reaction. The reactions occurring in solutions and precipitation reactions. Acid-base reactions. Oxidation and reduction reactions. Endo- and exothermic reactions. Photochemical reactions. Stoichiometry, nomenclature of chemical compounds:Nomenclature principles for basic inorganic compounds. Common and systematic names of hydrides, oxides, hydroxides, acids and salts. Nomenclature of selected groups of organic compounds. Structural and spatial isomerism. Isomery of the position and isomerization of functional groups. Geometric isomorphism and optical isomers. Empirical formula and molecular formula. Determination of molecular weight.
3. Electronic structure of atom and periodic system: Atomic orbitals. Principles of shell extension: Hund rule and Pauli rule. Hydrogen atom. Hydrogen-like atoms. Multi-electron atoms. Electron configurations of atoms. Periodic table. Periodicity of properties. Ionization potential. Atomic rays. Electronegativity. Electron affinity. Hydrides and oxides. Oxidation state.

4. Chemical bonds, chemical compounds - structure and properties. Polarization of bonds. MO theory, symmetry and types of molecular orbits (LCAO). The theory of valence bonds (VB). Hybridization of orbitals and particle geometry. VSEPR method. Delocalized bindings. Metallic, hydrogen bonding, van der Waals. Bonding and geometric characteristics. Hydrogen. Characteristics and types of hydrides. Water, its physical and chemical characteristics. Association and dissociation of water. Construction of ice crystals. Hydrogen peroxide. Peroxides and suboxides. Peroxygen. Oxygen and its compounds.
5. Acid-base reactions in solutions: Aqueous solutions. Electrolytes and non-electrolytes. Dissociation Electrolytic. Balance in electrolyte solutions. Constant and degree of electrolytic dissociation. Activity and activity factor. Ionic force. Product of solubility and activity. Acids, bases, salts. Theories: Arrhenius, Brønsted, Lewis. Balance. Amphotericism, hydrolysis, buffers, theory of indicators.
Tutorials
Basic concepts and chemical laws: Chemical substance, elements and chemical compounds. The law of mass preservation. The law of fixed and multiple relations. The law of simple volumetric relations. Atom and molecule. Mole. Atomic mass. Molecular atomic and molecular mass. Determination of experimental design and molecular formula. Gas law. The ideal gas status. Isothermal, isobaric and isochoric. Chemical compound and mixture. Solutions. Expressions of composition and concentration: percentage composition, mole fraction, concentration. Stoichiometry and chemical reactions: Chemical equation. Reminder of the nomenclature of basic inorganic compounds. Traditional names and systematic names of hydrides, oxides, hydroxides, acids and salts. Nomenclature of selected groups of organic compounds. Types of chemical reactions: synthesis, analysis, and exchange. Combustion reaction. The reactions occurring in solutions and precipitation reactions. Acids and rules. Neutralization reaction. Sole. Electrolytes and non-electrolytes. Electrolytes weak and strong. Acid-alkaline balance. Oxidation and reduction reactions. Coefficients.

Prerequisites and co-requisites

no requirements

Assessment methods and criteria

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

Recommended reading

Basic literature	1. Bielański A., Podstawy chemii nieorganicznej. PWN, Warszawa, 2010oraz wydania wcześniejsze. 2. Jones L., Atkins P.: Chemia ogólna.PWN, Warszawa, 2004 oraz wydania następne. 3. Cox P.A.,Krótkie wykłady. Chemia Nieorganiczna, PWN, Warszawa, 2003. 4. KChNPG, skrypt on-line http://www.kchn.pg.gda.pl/?p=skrypt_cw
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. 4. Praca zbiorowa (Chmurzyński L., Gleich E., Myszka H.,Nesterowicz M., Smiatacz K., Widernik T.: Obliczenia z chemii ogólnej.Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2007
eResources addresses	Adresy na platformie eNauczanie:

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?

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Work placement

Not applicable

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