

Course title Chemia ogólna/General chemistry		ECTS code 7.2.0590	
Name of unit administrating study Faculty of Chemistry			
Studies			
Field of study	Type	Form	
Environmental Protection	Bachelor	Full-time studies	
Teaching staff Dr hab. Joanna Makowska, prof. UG			
Forms of classes, the realization and number of hours		ECTS credits 3	
A. Forms of classes, in accordance with the UG Rector's regulations lecture, auditorium classes		classes - 45 hours consultations - 15 hours student's own work - 115	
B. The realization of activities classes in the teaching room		TOTAL: 175 hours - 7 points ECTS	
C. Number of hours lecture 30 hours, auditorium 15 hours			
The academic cycle First year, winter semester			
Type of course obligatory		Language of instruction Polish	
Teaching methods Lecture with multimedia presentation; Solving of tasks		Form and method of assessment and basic criteria for evaluation or examination requirements	
		A. Final evaluation, in accordance with the UG study regulations Credit, a positive academic grade of a test	
		B. Assessment methods a test with open questions	
		C. The basic criteria for evaluation or exam requirements Lecture:- Positive academic grade of the written test consisting of 12-20 test and open questions covering issues mentioned in the lecture's content - Oral exam - complementary to the written exam, but only for those students who obtained 30-50% of points possible to receive from the written test Auditorium exercises: Positive academic grade of the two written tests	
Required courses and introductory requirements not required			
Aims of education - acquainting students with the basic types of inorganic compounds and methods of balancing chemical reaction equations - introducing the basics of chemical calculations to students - acquainting students with all issues listed in the lecture program content			

Course contents

Lecture topics: Basic concepts and chemical principles (Chemical substance, chemical elements and compounds. Atom and molecule. The principle of conservation of mass and energy. The law of constant and multiple relations. The law of simple volume relations. Chemical compound and mixture.); Atom structure (Periodic law. Electron and atomic nucleus, neutron and proton. Atomic mass and atomic weight. Atomic orbitals and quantum numbers. Ionization potential, electron affinity, sizes of atoms and ions. Principles of developing electron shells. Electronic configurations of atoms); Basic concepts in radiochemistry (Hydrogen isotopes. Types of radioactive transformations); Molecule (Chemical bonds. Binding energy. Electronegativity. Hybridization and geometry of the molecule. VSEPR method); Kinetics and chemical equilibrium (Speed of chemical reactions. Factors affecting the rate of chemical reaction. Types of kinetic equations. Multi-stage reactions. Law of mass action and equilibrium constant. The influence of external factors on chemical equilibrium); Solutions (Solutions of non-electrolytes (colligative properties). Electrolyte solutions - theory of strong electrolytes (dissociation and degree of dissociation).); pH of aqueous solutions (Acids and bases - theories of acids and bases. Neutralization. Ionic product of water. pH scale. pH indicators. pH of aqueous solutions of strong acids and bases); Fundamentals of electrochemistry (Basic issues of electrochemistry (semi-cell, cell, electrode, Nernst equation, hydrogen electrode). Electrochemical series of metals. The possibility of reacting metal with water, non-oxidizing and oxidizing acids depending on its location in the periodic system. Electrolysis. Electrode reactions of simple inorganic compounds. Electrolysis balance - Faraday's law.)

Auditorium issues: Balancing chemical reaction equations (methods for obtaining oxides, acids, bases and salts as well as their names and chemical properties; ways of describing chemical reactions; ways of selecting stoichiometric factors in redox equations with particular emphasis on the half-reaction method and input); Basic chemical laws and concepts (absolute mass of atom and molecule; relative atomic mass and molecular; concept of mole; Avogadro number; molar mass; chemical equivalent and weight equivalent; basic chemical laws; Avogadro law; Clapeyron equation; Dalton's law) ; Stoichiometry (determination of the quantitative composition of chemical compounds; determination of the chemical formula from the quantitative composition of a chemical compound - empirical formula and real formula; calculations based on chemical equations); Solution concentrations (percentage, molar, normal, molar fraction, ppm and ppb); Chemical equilibrium (chemical equilibrium concept; chemical equilibrium constant; the rule of Le Chatelier-Braun).

Bibliography of literature

A. Literature required to pass the course

A.1. used during classes

Group work - Calculations in general chemistry - UG script

A.2. studied independently by the student

A. Bielański – Chemia ogólna i nieorganiczna

J. D. Lee - Związła chemia nieorganiczna

L. Jones, P. Atkins – Chemia ogólna

B. Extracurricular readings

B. Supplementary references:

J. Amiel – Chemia ogólna

L. Sobczyk, A. Kiszka – Chemia fizyczna dla przyrodników,

F.A. Cotton, G. Wilkinson, P.L. Gaus – “Chemia nieorganiczna”