UNIWERSYTET GDAŃSKI

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

A. Forms of classes, in accordance with the UG Rector's regulations
lecture, auditorium classes

B. The realization of activities
classes in the teaching room

C. Number of hours
lecture 30 hours, auditorium 15 hours

ECTS credits 7

classes - 45 hours
consultations - 15 hours
student's own work - 115
TOTAL: 175 hours - 7 points ECTS

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 pronciple 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 - Zwięzła chemia nieorganiczna

L. Jones, P. Atkins – Chemia ogólna

B. Extracurricular readings

B. Supplementary references:

J. Amiel – Chemia ogólna

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

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