Course code: ……. **Plan position:** ……

A. INFORMATION ABOUT THE COURSE

B. Basic information

Name of course	***General and Inorganic Chemistry***
Field of studies	Chemical Technology
Level of studies	First degree
Profile of studies	General academic
Form of studies	Stationary
Specialty	1. Chemical process technology 2. Bioengineering 3. Chemistry and technology of cosmetics
Unit responsible for the field of studies	Faculty of Chemical Technology and Engineering/Division of General and Inorganic Chemistry
Name and academic degree of teacher(s)	Terese Rauckyte-Żak, PhD; Katarzyna Witt, PhD; Mariusz Sulewski, PhD
Introductory courses	Not available
Introductory requirements	Elementary concepts of chemistry such as element symbols, chemical formulas of basic inorganic compounds and writing of chemical reactions

C. Semester/week schedule of classes

Semester	Lectures (W)	Auditorium classes (Ć)	Laboratory classes (L)	Project classes (P)	Seminar (S)	Field classes (T)	Number of ECTS points
winter	30	15	30				8
summer	30	15	45				9

2. LEARNING OUTCOME

No.	Learning outcomes description	The reference to the learning outcomes of specific field of study	The reference to the learning outcomes for the area
KNOWLEDGE			
W1	Has a structured, theoretically underpinned knowledge of general and inorganic chemistry and inorganic qualitative analysis.	K_W03	P6S_WG
SKILLS			
U1	Be able to characterize different states of matter, distinguish between types of chemical reactions and have the ability to select a reaction for qualitative determination.	K_U09	P6S_UW
U2	Use basic laboratory techniques used in the chemistry laboratory.	K_U10	P6S_UW

U3	Adheres to the health and safety rules associated with chemical laboratory activities.	K_U14	P6S_UW
U4	It implements proper waste management in the laboratory.	K_U15	P6S_UW
U5	Solves simple tasks related to the implementation of processes and unit operations in inorganic chemistry.	K_U18	P6S_UW
SOCIAL COMPETENCES			
K1	Is aware of the need to observe professional ethics.	K_K03	P6S_KR
K2	Is aware of the responsibility for jointly carried out tasks related to teamwork.	K_K04	P6S_KK P6S_KO
K3	Correctly identifies and resolves dilemmas related to the profession.	K_K07	P6S_KK

3. TEACHING METHODS

A. Traditional methods used

Multimedia lecture, laboratory experiments performed by students under supervision of academic staff.

4. METHODS OF EXAMINATION

Written examination on lecture topics (2 approaches), 2 written colloquia on laboratories (3 approaches to each) and one written colloquium on classes (3 approaches).

5. SCOPE

Lectures	Winter Kinetics, reaction rates, catalysis and chemical equilibrium, equilibrium constant K, Le Chatelier - Braun's rule. Ionic equilibria in electrolyte solutions, electrolytic dissociation. Acid and base theories (Bronsted, Lewis), pH of solutions, hydrolysis, buffers. Solubility and solubility product (precipitation of precipitates from aqueous solutions). Redox processes. Electrochemistry: Nernst potential, electrodes and cells, voltage series of metals. Crystal structure of solids. Atomic structure, quantum numbers, s-, p- and d-type orbitals, Pauli's prohibition, Hund's rule. Electron configurations of the elements. Periodic table. Electron structure versus atomic properties of the elements (ionisation energy, electronegativity, atomic/ionic radii). Ground and excited states of atoms. Fundamentals of molecular orbital theory. Hybridisation, π and σ bonds. Types of chemical bonds (ionic, covalent (coordination), metallic); bond polarity, dipole molecules, dielectric constant; dispersion forces, van der Waals and hydrogen bonds. Summer Chemistry of the main group elements: the group I elements (Li, Na, K, Rb, Cs), beryllium and the group II (Mg, Ca, Sr, Ba, Ra), the group III (Al, Ga, In, Tl), carbon, the group IV (Si, Ge, Sn, Pb), nitrogen, the group V (P, As, Sb, Bi), the group VI (S, Se, Te, Po), the halogens and the noble gases. Chosen elements of subgroups (zinc, cadmium and mercury; titanium, vanadium, chromium, manganese, triads of iron, cobalt, nickel, copper and the platinum metals).
Classes	Winter Stoichiometry of reactions, stacking and balancing chemical reaction equations. Stoichiometric calculations. Calculation of concentrations of solutions. Equilibria in electrolyte solutions. Persistence of complex compounds and equilibria in their solutions.

	Summer Ionic equilibria in the liquid phase (pH, hydrolysis, buffer). Equilibrium in the solid - liquid phase (solubility product, precipitation from aqueous solutions and dissolving of deposits). The stability of complex compounds and the equilibrium in their solutions.
Laboratories	Winter Health and safety in the laboratory, laboratory regulations, laboratory equipment. Kinetics and equilibrium of chemical reactions. Equilibrium in electrolyte solutions, dissociation. Hydrolysis of salts, pH, buffer solutions, indicators. Preparation and study of complex and amphoteric compounds. Equilibrium in the solid-solution system. Equilibrium in redox reactions. Voltage series of metals. Summer Introduction to inorganic qualitative analysis of ions. Systematic analysis of anions and cations: analysis of the mixture of simple anions, analysis of mixtures of individual groups of I-V cations (according to Fresenius) and mixture of all five studied groups of cations. Anion analysis by a simplified method: analysis of the mixture of anions of one of four groups (A-D). Analysis of two samples of solid substances.

6. METHODS OF VERIFICATION OF LEARNING OUTCOMES

LEARNING OUTCOME	Form of assessment					
	Oral examination	Written exam	Colloquium	Project	Report	Credit for experiments
W1		x	x			
U1			x		x	x
U2						x
U3			x			
U4					x	x
U5			x		x	
K1						x
K2						x
K3						x

7. LITERATURE

Basic literature	1. Cotton F.A., Wilkinson G., Gaus P.L., 1987. Basic inorganic chemistry (second edition). John Willey & Sons, Inc. 2. Cotton F.A., Wilkinson G., 1988. Advanced inorganic chemistry (fifth edition). John Willey & Sons, Inc. 3. Gerloch M., Constable E.C., 1994. Transition metal chemistry: the valence shell in d-block chemistry. VCH Weinheim and VCH Publishers, New York. 4. Pazdro K.M., Rola-Noworyta A., 2013. Akademicki zbiór zadań z chemii ogólnej (Academic collection of general chemistry exercises). 5. Sienko M.J., Plane R.A., 1979. Chemistry: principles and applications. McGraw-Hill Book Company.
Supplementary literature	1. Wiseman F.L., 1985. Chemistry in the modern world: concepts and applications. McGraw-Hill Book Company. 2. Materials prepared by lecturer.

8. TOTAL STUDENT WORKLOAD REQUIRED TO ACHIEVE EXPECTED LEARNING OUTCOMES EXPRESSED IN TIME AND ECTS CREDITS

Student's activity		Student workload– number of hours
Classes conducted under a direct supervision of an academic teacher or other persons responsible for classes	Participation in classes indicated in point 1B	135
	Supervision hours	105
Student's own work	Preparation for classes	90
	Reading assignments	45
	Other (preparation for exams, tests, carrying out a project etc)	60
Total student workload		435
	Number of ECTS points	**17**