



SYLLABUS
 «Chemistry I (Inorganic & Bioinorganic)»

Degree of Higher Education – Bachelor
Specialty 101 Ecology
Educational professional program - no
Year of training – the first; Semester: 1
Learning form – full-time
Amount of the ECTC credits 7
Language of instruction - English

Supervisor
Supervisor's contact
information (e-mail)
eLearn Course URL

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<https://elearn.nubip.edu.ua/enrol/index.php?id=1171>

DESCRIPTION OF COURSE

It is the purpose of the discipline is to learn the various aspects of inorganic chemicals and the environment and the role that inorganic can play dealing with the various issues of the environment. Students will be presented with the definitions and explanations of terms related to inorganic chemistry and how inorganic chemistry can be understood and used and the effects of the chemical on the environment.

The discipline studies the theoretical foundations of contemporary Inorganic Chemistry and data about features of bio-elements. Bioinorganic chemistry studies the function of bio-active compounds included atoms of a few metals or non-metals, particularly metal-complex compounds (ferine, chlorophyll etc.) and their biocatalyst functions.

STRUCTURE OF COURSE

Chapter	Hours (lectures/labs)	Results of learning	Tasks	Grading, scores
The fall semester, the 1st year of study				
Module the 1st. The Foundations of Inorganic Chemistry				
Chapter 1. Subjects and tasks of the inorganic & bioinorganic chemistry. Chemistry in environmental protection. Foundation of atomic-molecular studies.	6/2	To know the safe rules in chemical laboratory; classification of the inorganic substances; stoichiometric chemical laws; types of chemical reactions; relations of the chemical transformations and environmental processes; the foundations of atomic-molecular study. To know how to organize the working place and realize the lab techniques of semimicro tube tests; to work with educational literature and to organize own independent study. To understand the importance of the chemistry as a science about principles of the Universe existing and development; the criticism of chemophobia. To use the mole concept in stoichiometric calculations.	Introduction testing Lab test tube experiment – properties of the main classes of inorganic substances Control test	7

<p>Chapter 2. Atomic structure and chemical bonding. The Periodical Law and Mendeleev Periodical Table of the Chemical elements</p>	8/10	<p>To know evolution of atomic ideas; the modern theory of atomic structure; the dual nature of electron and concept of atomic orbital; the mechanism of the chemical bonding of atoms; concept of valence and oxidation number of an atom as a function of the outer electron shell composition; mechanism of chemical bond formation; the logics of the Periodicity.</p> <p>To understand trends in periodic table and applications in predicting and explaining the chemical behavior; the biological role of hydrogen bonding.</p> <p>To have skills of calculation of bonding type based of atomic electronegativity; to determine the possible valencies and oxidation numbers of the elements based of their electron configuration; to calculate type of chemical bonding based of electronegativity; to determine the metallic or non-metallic or metalloid properties of chemical elements.</p>	Module control test Elern testing	3
<p>Chapter 3. Rate of the chemical reactions: The Law of acting masses; factors affecting on the rate. Chemical equilibrium and Le Chatelier's principle</p>	6/8	<p>To know the content and math expression of the basic concentration units; the nature of chemical transformations in water solutions (electrolytic dissociation, hydrolysis); a concept of a pH.</p> <p>To know how to determine a pH of a medium; to regulate a pH using buffer solutions; compile an ionic equation; to predict the pathway of the chemical interaction in solutions; to use dissociation constant of electrolytes in Ostwald's dilution Law; to influence of ionic composition in body fluids using electrolytic drinks;</p> <p>To have skills of acid-basic indicators application of a pH measuring; how to prepare of solutions of a taken concentration.</p> <p>To understand how to apply the concentration units at veterinary practice.</p>	Lab test tube experiments. Volumetric determination of the temporary water hardness. Module control tests Elern testing	3
<p>Total the 1st module</p>	20/20			13
<p>Module the 2^d. Chemical transformations without change of oxidation degree/valency</p>				
<p>Chapter 1. The general foundations of</p>	2/4	<p>To know the content and math expression of the basic concentration units; the nature of water as universal solvent. Water in nature. Water</p>	Module control tests Elern testing	3

processes in aqua solutions.		<p>pollution.</p> <p>To know how to calculate and transform of the concentration units used in chemistry and the environmental chemistry.</p> <p>To understand the role of water in environmental processes.</p>		
Chapter 2. Acid-base chemistry & hydrolysis.	6/16	<p>To know the concepts of chemical transformations in water solutions (electrolytic dissociation, hydrolysis); an idea of a pH.</p> <p>To know how to determine a pH of a medium; to regulate a pH using buffer solutions; compile an ionic equation; to predict the pathway of the chemical interaction in solutions; to use dissociation constant of electrolytes in Ostwald's dilution Law; to influence of ionic composition in body fluids using electrolytic drinks;</p> <p>To have skills of acid-basic indicators application of a pH measuring; how to prepare of solutions of a taken concentration.</p> <p>To understand how to apply the acid-base transformations and hydrolysis; regulation of a pH for environmental practice.</p>	Lab test tube experiments. Module control tests Elern testing	12
Total 2^d module	8/20			15
Module the 3^d. Chemical transformations changing oxidation degree/valency				
Chapter 1. RedOx processes: the basic concept and applications	4/12	<p>To know the concept of redistribution of electrons at RedOx transformations; typical reduction and oxidating agents among inorganic substances; influence of a pH into RedOx processes; the quantitative parameters of RedOx processes (electrode potential, EMF).</p> <p>To understand the methodology of a product predicting for RedOx reactions based on electronegativity of elements; function the chemical source of electricity.</p> <p>To apply the method of electron balancing and half-reaction method for the balancing of Red-Ox processes;</p> <p>To have practical skills of to compile of redox equations between typical inorganic RedOx agents; of predicting of product composition in Red-Ox reactions; of experimental application of these transformations.</p>	Lab test tube experiments. Module control testing. Elern testing	10
Chapter 2. Complex compounds.	4/8	<p>To know the concept of Verner's Theory of Complex compounds; donate (coordinative) chemical bonding in formation of complex compounds; stability constant; isomerism, biological activity of complex compounds, including the anticancer drugs; bioinorganic systems as complex compounds.</p> <p>To have skills of compilation of reaction equations with complex</p>	Lab test tube experiments. Module control testing. Elern testing	5

		compounds; realization of qualitative tests used complex compounds; To understand the concept of multidental ligands and their using in medicine practice (e.g., ferrioxime, DisodiumEDTA).		
Total 3^d module	8/20			15
Module the 4th. Bioinorganic properties and application of the main groups of the chemical elements				
Chapter 1. Inorganic and Bioinorganic chemistry of the main bio-active elements and their inorganic compounds. The chemical processes controlling transformations of the chemical compounds in the environment.	24/30	To know the correlation of electron structure of the chemical elements and their chemical properties; the main acid-basic and RedOx properties of the basic bio-active chemical elements (“Big Six”, micro- and micronutrients) and their compounds; the chemical processes controlling transformations of the chemical compounds in the environment. To have skills of description of inorganic transformation in the environment; how to use the acid-base or redox processes for the protection against environmental pollution (geochemical barriers etc). To understand the concept of human and animal endemic diseases as the results of the abnormal distribution of the chemical elements in the environment; the chemical nature of negative environmental processes (photochemical mug; acidic rains; greenhouse effect, the ozone hole etc).	Lab test tube experiments. Module control testing. Elern testing	22
Total the 3^d module	24/30			22
Total				70
Exam				30
Finally				100

EVALUATION POLICY

<i>Deadline policy and exam retake allowing:</i>	Works that are submitted in violation of deadlines without good reason are evaluated at a lower grade. Retake of tests takes place with the lecturer’s permission if there are good reasons (for example, student was sick and has the hospital sheet).
<i>Academic Integrity Policy:</i>	Write-offs during tests and exams are prohibited (including using mobile devices).
<i>Attendance Policy:</i>	Attendance is a mandatory component of the grade for which points are earned. For objective reasons (such international internship, sickness), teaching may be provided on-line, in agreement with the Dean.

GRADING SYSTEM

Rating of Higher education applicant, scores	National grade according to the results of written examination	
	exam	test
90-100	Excellent	Pass
74-89	Good	
60-73	Satisfactory	
0-59	Unsatisfactory	Fail