



SYLLABUS

«Chemistry with the Foundations of Biogeochemistry»

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

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

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<https://elearn.nubip.edu.ua/course/view.php?id=1105>

DESCRIPTION OF COURSE

Discipline studies chemical, physical, geological and biological processes that are regulating the composition of the environment, biogeochemical cycles in their interaction with living matter through the biological systems of the Earth in time and space. The course includes the laws of the chemical composition formation of the ecosphere; principles of biogeochemical zoning, biogeochemical provinces and endemic diseases in them; theories of the origin of life, ways and types of biogenic and anthropogenic migration of chemical elements; methods for predicting chemical transformations of pollutants; mechanisms of isotope fractionation with living matter; the role of living matter in the geochemical processes of hypergenesis and crust weathering; biogeochemical patterns based on methods of chemical indication of the environmental state; transformation of xenobiotic.

STRUCTURE OF COURSE

Chapter	Hours (lectures/labs)	Results of learning	Tasks	Grading, scores
The fall semester, the 4th year of study				
Module the 1st. Biogeochemical characteristics of the ecosphere composition				
Chapter 1. Introduction. The object of research and the goal of the discipline. Life origin on the Earth: hypotheses and experimental.	4/6	Know the subject and objectives of the course; areas of environmental issues related to biogeochemistry; modern ideas about the biochemical aspects of the life origin on the Earth (Oparin-Holden theory, RNA theory; progress in creating "artificial" life forms; safety in the chemical laboratory; Be able to work and analyze scientific and educational literature on the subject; Gain practical skills and be able to apply methods and equipment of rapid analysis on the example of determining the content of active chlorine. pH in drinking water; statistical processing of experimental results.	Lab works processing and its defending; online testing on Elearn platform	7

Chapter 2. The ecosphere, the chemical elements and biogeochemical laws	4/4	Know different approaches to the formulation of the biosphere concept in terms of its chemical structure and laws of function; Understand the role of living matter as the main driving force of chemical transformation of the biosphere; the reasons for the existence of different types of classification of bioactive elements; biogeochemical functions of living matter. Apply quantitative laws (eg, Redfield atomic ratio, Le Chatelier principle) for environmental forecasts; Gain practical skills to perform analyzes of natural water pollutants (total iron content, nitrates)	Lab works processing and its defending	7
Chapter 3. Biogeochemical zoning and endemic diseases	8/6	Know the basic concepts of biogeochemical zoning and biogeochemical chains according to Kowalski; types and causes of typical endemic diseases, especially in Ukraine; Understand the consequences of the anomalous distribution of chemical elements in the hydrosphere and lithosphere on the functioning of living matter; methods of prevention and treatment of endemic diseases; Gain practical skills of analytical determination of the content of fluorides, calcium, and magnesium in natural waters, the abnormal distribution of which is the cause of endemic diseases.	Lab works processing and its defending; Module control test	20
Total the 1st module	16/16			34
Module the 2^d: Biogeochemical cycles of the main bioactive chemical elements				
Chapter 1. General notions about Biogeochemical cycles. Features of sediment and gaseous biogeochemical cycles. Biogeochemical barriers.	12/10	Know classification, physical, chemical, and biological processes founded of biogeochemical cycling; the energy sources for the realization of the biogeochemical cycling; the experimental proofs of chemical elements cycling in ecosphere; how to apply chemical processes for the organization of biogeochemical barriers dor the prevention of migration of pollutants (acid-basic, clay; RedOx barriers etc.). Understand the experimental proofs of alive matter role in cycling of chemical elements; degree of anthropogenic pressure into biogeochemical cycles; why different scientists give the various quantitative assessment of pools, fluxes, exchange and reserve funds; Gain practical skills of analytical determination of caffeine content in beverages and foods (as psychoactive heterocyclic compound of Nitrogen);	Lab works processing and its defending; online testing on Elern platform	16

		determination of active oxygen content and phosphates (as anthropogenic pollutants of natural waters) in laundry detergents and bleaching agents.		
Chapter 2. Chemistry of preservatives as xenobiotics	2/4	Know the theoretical foundations of application and chemical mechanism of natural and artificial preservatives in food, cosmetic, pharmaceutical, wood-processing and other branches; their classification; risks of xenobiotic preservatives application; Understand the risks for human health of preservatives using; but why modern foods, cosmetic goods, medicine drugs etc., are impossible to safe without preservatives; Apply the knowledge of preservative safety and risks in everyday life; Gain practical skills of analytical determination of preservative E220 content (Sulfur dioxide) in foods and grape-contenting drinks.	Lab works processing and its defending; Module control test	20
Total the 2d module	14/14			36
All				70
Final testing				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; took part in university event, scientific meeting etc.).
<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