SYLLABUS OF AN ACADEMIC DISCIPLINE
«Biogeochemistry»

Academic Degree – Bachelor's	
Specialty 101 Ecology	
Educational program - no	
Year of study – the forth; Semester: 7	
Form of study – full-time	
Number of ECTS credits - 4	
Language of instruction - English	
Lecturer of the discipline	**Voitenko Larysa Vladyslavivna, Candidate of Chem Sci, Docent**
Lecturer's contact information (e-mail)	**voitenko@nubip.edu.ua**
URL of the e-Learning course on the NULES e-learning portal	https://elearn.nubip.edu.ua/course/view.php?id=1105

ACADEMIC DISCIPLINE DESCRIPTION

Biogeochemistry 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.

Competences of the discipline:

Integral competence (IC): The ability to solve complex specialized problems and solve practical problems in the field of ecology, environmental protection, and sustainable environmental management, which involves the application of basic theories and methods of science about environments that are characterized by complexity and uncertainty of conditions.

General competences (GC):

GC1. Knowledge and understanding of the subject area and professional activity

GC8. Ability to conduct research at the appropriate level

GC10. The ability to evaluate and ensure the quality of performed works.

Special (professional) competences (SC):

SC2. Ability to critically understanding and basic theories, methods and principles of natural sciences.

SC 3. Ability to understand basic theoretical concepts regulations, concepts and principles of natural and of social and economic sciences.

SC7. Ability to monitor and evaluate current condition of environment based on analytical monitoring data.

Expected Learning Outcomes (ELO):

ELO 3. Understand the basic concepts, theoretical and practical problems in the field of natural sciences, which are necessary for analysis and decision-making in the field of ecology, environmental protection and balanced nature management.

ELO 14. Be able to create texts, make presentations and messages for professional audiences and the general public with observance of professional integrity and impossibility plagiarism.

ELO 18. Combine the skills of independent and team work to achieve results with an emphasis on professional integrity and responsibility of or decision-making.

ELO 19. Increase the professional level by continuing education and self-education.

ELO 21. To be able to choose optimal methods and tools for research, collection and data processing.

ACADEMIC DISCIPLINE STRUCTURE

Topic	Hours (lectures /laboratory)	Learning outcomes	Tasks	Assess-ment
The 7th semester				
Module the 1st.Biogeochemical characteristics of the ecosphere composition				
Topic 1. Introduction. The object of research and the goal of the discipline. Life origin on the Earth: hypotheses and experimental.	2/6	**Know** and understand the subject area and professional activity**;** **Be able to work and analyze** scientific and educational literature on the subject; **Gain practical skills and be able** monitor and evaluate current condition of environment based on analytical monitoring data.	Lab works processing and its defending; online testing on Elern platform	**7**
Topic 2. The ecosphere, the chemical elements and biogeochemical laws	2/4	**Know** the basic concepts, theoretical and practical problems in the field of natural sciences, which are necessary for analysis and decision-making in the field of ecology, environmental protection and balanced nature management; **Understand** how to choose optimal methods and tools for research, collection and data processing. **To be able** to conduct research at the appropriate level; **Gain practical skills** to perform analyzes of natural environment.	Lab works processing and its defending	**7**
Topic 3. Biogeochemical zoning and endemic diseases	4/6	**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 environmental components.	Lab works processing and its defending; Module control test	**20**
Total the 1st module	8/16			**34**
Module the 2d: Biogeochemical cycles of the main bioactive chemical elements				
Topic 1. General notions about Biogeochemical cycles. Features of sediment and gaseous biogeochemical cycles.	5/10	**Know** classification, physical, chemical, and biological processes founded of biogeochemical **Understand** the basic concepts, theoretical and practical problems in the field of biogeochemistry, which are necessary for analysis and decision-making in the field of environmental protection and balanced nature management	Lab works processing and its defending; online testing on Elern platform	**16**

Biogeochemical barriers.		**Gain practical skills** of analytical determination of artificial and natural constituents.		
Topic 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; **Apply** the knowledge of preservative safety and risks in everyday life; **Gain practical skills** of analytical determination of preservative	Lab works processing and its defending; Module control test	**20**
Total the 2 d module	7/14			**36**
Total for semester				**70**
Examination				**30**
Total for the course	**15/30**			**100**

ASSESSMENT POLICY

Deadlines and exam retaking policy:	Works that are submitted late without valid reasons will be assessed with a lower grade. Module tests may be retaken with the permission of the lecturer if there are valid reasons (e.g. a sick leave).
Academic integrity policy:	Cheating during tests and exams is prohibited (including using mobile devices). Term papers and essays must have correct references to the literature used
Attendance policy:	Attendance is compulsory. For good reasons (e.g. illness, international internship), training can take place individually (online by the faculty dean's consent)

SCALE FOR ASSESSING STUDENTS 'KNOWLEDGE AND SKILLS

Student's rating, points	**National grading of exams and credits**	
	exams	**credits**
90-100	excellent	pass
74-89	good	
60-73	satisfactorily	
0-59	unsatisfactorily	fail

RECOMMENDED SOURCES OF INFORMATION

1. Voitenko L. Chemistry with the foundations of biogeochemistry: manual. Kyiv: Naukova stolytsa, 2019. 400 p. (In Ukrainian).
2. Schlesinger W., Bernhardt E. Biogeochemistry: An Analysis of Global Change, Third Edition. Biogeochemistry: An Analysis of Global Change. 2013. San Diego: Academic Press. 672 p.
3. Voitenko, L.V. Lab workbook in Biogeochemistry for Bachelor students of Ecology. Lab Manual. Kyiv:Expo-druk. 2020. 98 p.
4. Основи біогеохімії: навчальний посібник / С. І. Цехмістренко,Н. В. Пономаренко, В. М. Поліщук, С. А. Поліщук, О. С. Цехмістренко; за редакцією С. І. Цехмістренко. Біла Церква, 2023. 183 с. URL: https://rep.btsau.edu.ua/bitstream/BNAU/8492/1/Osnovy_%20bioheokhimii.pdf