EPP Environmental Biotechnology

No	Course titles
1st year	
1	Health-Preserving Technologies
2	Human Ecology
3.	General Immunology
4.	Fundamentals of Bioethics
5.	Fundamentals of Biosafety
6.	Environmental Safety
7.	Environmental Chemistry
8.	Fundamentals of Biogeochemistry
9.	Biology of Individual Development
10.	Fundamentals of Embryology
2nd year	
1.	Soil Science
2.	Colloid Chemistry and Soil Chemistry
3.	Symbiotic Interactions of Plants
4.	Ecology of Microorganisms
5.	Animal Ecology
6.	Plant Ecology
7.	Environmental Risk Assessment
8.	Standardization and Certification of Biotechnological Products
9.	Examination of Biotechnological Processes and Equipment
10.	Mycology
11	Algology
12.	Enzymology
3rd year	
1.	General Phytopathology
2.	Environmental Impact Assessment
3.	Bioindication of Aquatic Ecosystems
4.	Bioindication and Biotesting of Soils
5.	Biotechnological Analytical Systems
6.	Biotechnology of Medicinal Plants
7.	Plant Immunity
8.	Mathematical Modeling and Optimization of Biotechnological Processes
9.	Modeling and Forecasting of Environmental Conditions
10.	Fundamentals of Bioindication and Biotesting
11.	Environmental Impact Assessment
12.	Forecasting of Agricultural Crop Diseases
13.	Systems Analysis of Environmental Quality
14.	Plant Resistance to Biotic Stressors

1st year of study

HEALTH-PRESERVING TECHNOLOGIES

Educational program	Educational and professional program "Environmental Biotechnology"
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Candidate of Pedagogical Sciences, Associate Professor **Liubov Barna**
Course Language	Ukrainian
Department	Department of General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	1st
Semester	1 semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The main objective of the course "Health-Preserving Technologies" is to develop students' understanding of a wide range of traditional (such as hardening practices, movement-based wellness techniques, massage, reflex prophylaxis, yoga, aromatherapy, etc.) and innovative (such as art therapy, sand therapy, laughter therapy, immune and stimulating gymnastics, visual gymnastics, and animal-assisted therapy) health-preserving technologies. The course aims to cultivate practical skills in applying these methods in everyday life, designing individual wellness programs, and fostering motivation for maintaining a healthy lifestyle. Additionally, it prepares students to conduct educational and awareness-raising activities related to health preservation.

HUMAN ECOLOGY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Candidate of Biological Sciences, Associate Professor **Halyna Humeniuk**
Course Language	Ukrainian
Department	Department of General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	1st
Semester	1 semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The course "Human Ecology" is aimed at studying the patterns of emergence, existence, and development of anthropoecological systems, which represent human communities that are in a dynamic relationship with their environment, as well as ensuring a balanced relationship between humans and nature for maintaining ecological stability, health, and well-being. It also aims at forming in students scientific and theoretical knowledge and practical skills regarding the general patterns of human interaction with the environment; the influence of natural and anthropogenic environmental factors on the functioning of the human organism; physiological mechanisms of human adaptation to environmental conditions; the valeological aspect of health, longevity, and a healthy lifestyle; and purposeful management of maintaining and improving the physical and psychological health of the population.

GENERAL IMMUNOLOGY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Biological Sciences, Associate Professor **Olena Voloshyn**
Course Language	Ukrainian
Department	Department of General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	1st year
Semester	1st semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The course "General Immunology" aims to develop in bachelor's degree students knowledge about immune protection and its mechanisms, the ability to analyze the functional significance of structural elements of the immune system, to understand the mechanisms of immune reactions in the realization of innate and acquired immunity, as well as the basic knowledge of immune response disorders and allergic-type reactions. Studying the course will enable students to acquire appropriate knowledge about antigens and antibodies, innate and acquired mechanisms of immune protection, the peculiarities of immune response organization, and to understand the consequences of immune system dysfunction. It will also allow them to apply knowledge about the principles of immune system organization, physiological regularities of its functioning, the structure of immune system organs, and knowledge about the types and mechanisms of immunity in their professional activities.

FUNDAMENTALS OF BIOETHICS

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Doctor of Pedagogical Sciences, Professor **Alla Stepaniuk**
Course Language	Ukrainian
Department	Department of General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	1st
Semester	2nd semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The study of this academic discipline contributes to the development of a conscious moral attitude toward all living beings and a respectful and reverent attitude toward human life, as well as the formation of a worldview that will allow building relationships with other inhabitants of planet Earth on a scientific basis — that is, reorienting worldview priorities from the currently dominant concept of anthropocentrism to the concept of bio-ecocentrism, without which any approach to implementing the issue of ecological education will not be holistic from the standpoint of pedagogical science. It is intended to consider nature in its integrity and to model one's own behavioral strategy in the biosphere under the slogan "Knowledge for the Sake of Life on Planet Earth," whose leading idea lies in realizing oneself as an integral part of the biosphere and understanding that all one's activity and behavior must be subordinated to the interests of higher-level systems (the species, the biosphere).

FUNDAMENTALS OF BIOSAFETY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Doctor of Biological Sciences, Professor **Liudmyla Hrytsak**
Course Language	Ukrainian
Department	Department of General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	1st
Semester	2nd semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The study of the discipline material will form a system of knowledge about the causes and ways of emergence of biological threats, the safety of using modern biotechnologies, and the specifics and regularities of legal regulation of biological and medical research. The acquired basic knowledge will allow for quick assessment of the level of biological risk for humans and the biosphere, will promote a deeper understanding of the algorithms for implementing organizational and engineering-technical measures, and the use of specific means and instrumental bases for managing the risks of negative impacts of hazardous biological factors on living organisms and the environment. It will form a clear system for applying preventive measures to minimize the probability of biological threats that may lead to significant negative environmental consequences and deterioration of human health.

ENVIRONMENTAL SAFETY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Doctor of Biological Sciences, Professor **Liudmyla Hrytsak**
Course Language	Ukrainian
Department	Department of General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	1st
Semester	2nd semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	Mastering the material of the discipline will make it possible to clearly distinguish between the concepts of safety and danger; to understand the place of environmental safety in the structure of national security, the main causes of the state of environmental danger, and the strategies for forming and managing an environmentally safe human living environment. The obtained basic knowledge will allow identifying types of hazards, phenomena, and processes that cause them; scientifically substantiating permissible loads on environmental objects; mastering the methods of calculating the integral risk of environmental safety for regions of Ukraine, assessing the risk of mortality of the Ukrainian population, and the environmental risk of applying pesticides, heavy metals, and others.

ENVIRONMENTAL CHEMISTRY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	PhD **Oksana Horyn**
Course Language	Ukrainian
Department	Chemistry and Methods of Teaching Chemistry
Scope	3 ECTS credits
Year of Study	1st
Semester	2nd semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The purpose of the academic discipline "Environmental Chemistry" is to study the processes of migration and transformation of chemical compounds of natural and anthropogenic origin in the hydrosphere, atmosphere, and lithosphere. The course is aimed at forming ideas about the interconnection of natural physical, chemical, and biological processes in various Earth's spheres and the nature of the influence of human activity on them; skills in analyzing chemical processes occurring in the atmosphere, hydrosphere, and lithosphere, and in the migration and transformation of chemical compounds of natural and anthropogenic origin; as well as understanding the essence and consequences of problems arising in the process of anthropogenic impact on the environment, related to pollution of atmospheric air, soils, surface, and underground waters.

FUNDAMENTALS OF BIOGEOCHEMISTRY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Assistant **Bohdan Petruska**
Course Language	Ukrainian
Department	Chemistry and Methods of Teaching Chemistry
Scope	3 ECTS credits
Year of Study	1st
Semester	2nd semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The course "Fundamentals of Biogeochemistry" is based on modern ideas of chemical science, the main laws and concepts of classical chemistry, and lays the basic potential of knowledge necessary for bachelors. Fundamentals of Biogeochemistry studies the chemical, physical, and biological processes that regulate the composition of the environment and biogeochemical cycles. The purpose is to deepen students' assimilation of fundamental knowledge in the field of chemistry, which forms the basis for further study of the cycle of chemical and ecological disciplines and is widely used in practical work. The objectives of the course are to form a holistic system of knowledge in the fundamentals of general chemistry and the chemistry of the elements of the periodic system; to form ideas about the most important regularities of chemical processes, the role of chemical elements in living nature, their cycles and transformations in the biosphere, and to prepare students for effective mastering of specialized disciplines according to the curriculum; to justify the importance of chemistry and biogeochemistry in various branches of industry.

BIOLOGY OF INDIVIDUAL DEVELOPMENT

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Doctor of Biological Sciences, Professor **Oksana Bodnar**
Course Language	Ukrainian
Department	Department of General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	1st
Semester	2nd semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	Formation of a system of knowledge in students about the general and specific patterns of individual human development and the peculiarities of human functioning throughout ontogenesis in interaction with environmental conditions and in connection with its bio-social nature. To become familiar with the role of genetic, teratogenic, and social factors in the embryonic and post-embryonic development of humans. To clarify the characteristics and theories of human aging, as well as the mechanisms of biological integration and regulation of human body functions. An important aspect of studying this academic discipline is the integration, systematization, and analysis of the main biological, ecological, and social processes in the individual development of a human being.

FUNDAMENTALS OF EMBRYOLOGY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Doctor of Biological Sciences, Professor **Oksana Bodnar**
Course Language	Ukrainian
Department	Department of General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	1st
Semester	2nd semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	Formation of students' knowledge system regarding the general and specific patterns of individual human development and the peculiarities of human functioning throughout ontogenesis, in interaction with environmental conditions and in connection with its biosocial nature. To become acquainted with the role of genetic, teratogenic, and social factors in the embryonic and post-embryonic development of humans. To identify the characteristics and theories of human aging, as well as the mechanisms of biological integration and regulation of human body functions. An important aspect of studying this academic discipline is the integration, systematization, and analysis of the main biological, ecological, and social processes in the individual development of a human being.

2nd year of study

COLLOIDAL CHEMISTRY AND SOIL CHEMISTRY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Candidate of Biological Sciences, Associate Professor **Volodymyr Khomenchuk**
Course Language	Ukrainian
Department	Chemistry and Methods of Teaching Chemistry
Scope	3 ECTS credits
Year of Study	2nd year
Semester	1st semester
Form of Final Assessment	test
Link to Syllabus	
Course Description	The course *"Colloidal Chemistry and Soil Chemistry"* is aimed at forming in students an understanding of the main concepts, laws, and principles of colloidal chemistry, the chemistry of soil-forming processes, the chemical bases of soil fertility, and analytical soil chemistry. It highlights the theoretical foundations of soil chemistry: the elemental and phase (substance) composition of soils, the fundamental laws of ion exchange and adsorption, the formation of soil acidity and alkalinity. The course reveals the concept of soil buffer capacity, features of soil protection from chemical pollution, and methods of laboratory and analytical soil research.

SYMBIOTIC INTERACTIONS OF PLANTS

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Candidate of Biological Sciences, Associate Professor **Mariana Prokopiak**
Course Language	Ukrainian
Department	Botany and Zoology
Scope	3 ECTS credits
Year of Study	2nd year
Semester	3rd semester
Form of Final Assessment	test
Link to Syllabus	
Course Description	Formation of ideas about the structure of plant–microbial communities of the plant root zone and the processes that underlie plant–microbial interactions; the study of the role of endophytes in providing the plant with macro- and microelements and in producing biologically active substances. The study of the dependence of the composition of the phyllosphere and phylloplane microbiota on biotic and abiotic factors; the mechanisms of the influence of rhizosphere microorganisms on plant growth; the mechanisms of interaction between the legume plant and nodule bacteria. Formation of ideas about nodule nitrogen fixation and the use of the possibilities of legume–rhizobial symbiosis in agriculture. The study of the interaction of diazotrophs with plants as one of the main mechanisms of regulating the nitrogen cycle in the biosphere and their distribution in the soil. Investigation of the nitrogen-fixing potential of non-legume plants.

ECOLOGY OF MICROORGANISMS

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Candidate of Biological Sciences, Associate Professor **Oksana Matsiuk**
Course Language	Ukrainian
Department	Department of Botany and Zoology
Scope	3 ECTS credits
Year of Study	2nd year
Semester	2nd semester
Form of Final Assessment	test
Link to Syllabus	
Course Description	The study of the discipline *"Ecology of Microorganisms"* ensures the formation in students of knowledge about the stages of development of microbial ecology as a science, the influence of abiotic environmental factors on the life activity of microorganisms, adaptive reactions of microorganisms, forms of relationships between microorganisms themselves and with other organisms in nature, features of microbial cenoses, and the functions of microorganisms in the biosphere. The discipline is designed to form students' ability to analyze the influence of various ecological factors on the growth and development of microorganisms, to characterize and provide examples of different types of relationships of microorganisms in nature, to assess the influence of environmental pollution on microbial communities and the impact of microbial contamination on the environment.

ANIMAL ECOLOGY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Candidate of Biological Sciences, Associate Professor **Mariana Prokopiak**
Course Language	Ukrainian
Department	Botany and Zoology
Scope	3 ECTS credits
Year of Study	2nd year
Semester	4th semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	Obtaining an integrated understanding of the patterns of development and existence of animals on Earth based on knowledge of the features of intra- and inter-population relationships and the functioning of biogeocenoses; formation of knowledge about the regularities of interaction between invertebrate and vertebrate animals with environmental factors and the development of adaptive responses to their changes; understanding of the role of animals in biogeocenoses. Formation of a complex of knowledge about modern methods of studying animal ecology; identification of limiting factors in the life activity of animals of different taxonomic groups; development of understanding of the ecological characteristics of different animal species and their adaptations to existence under various environmental conditions. Promotion of ecological thinking in matters of conservation and protection of animal biodiversity. Formation of the ability to determine the place of animals within consortia of different levels of organization.

PLANT ECOLOGY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Biological Sciences, **Oksana Maiorova**
Course Language	Ukrainian
Department	Botany and Zoology
Scope	3 ECTS credits
Year of Study	2nd year
Semester	4th semester
Form of Final Assessment	test
Link to Syllabus	
Course Description	The educational discipline *"Plant Ecology"* is aimed at studying the diversity of plants, the interrelationships of plant organisms with each other and with the environment, and the conditions of their functioning in space and time under natural conditions. The main task of the course is to form in students an understanding of the features of functioning and adaptation of plants under conditions of natural and artificially created ecosystems, a holistic idea of the regularities of relationships between plants and their environment. Knowledge of the influence of ecological factors on plants and the response of plants to them is necessary for future specialists to effectively restore and manage abandoned or low-productive lands.

ECOLOGICAL RISK ASSESSMENT

Educational program	Ecological biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Biological Sciences, Associate Professor **Iryna Chen**
Course Language	Ukrainian
Department	General Biology and Methods of Teaching Natural Sciences Disciplines
Scope	3 ECTS credits
Year of Study	2nd year
Semester	4th semester
Form of Final Assessment	test
Link to Syllabus	
Course Description	The aim of the course is to form in students knowledge about the norms of permissible impacts of negative factors on humans and the environment, general principles and approaches to assessing environmental risks — both from systematic effects of technogenic systems and from extreme emergency situations — as well as skills to apply them in practice for quantitative and qualitative assessment of anthropogenic impact, forecasting the consequences of pollution for the environment and human health, identifying ecologically critical territories, and developing recommendations for their restoration.

STANDARDIZATION AND CERTIFICATION OF BIOTECHNOLOGICAL PRODUCTS

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Doctor of Biological Sciences, Professor **Liudmyla Hrytsak**
Course Language	Ukrainian
Department	General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	2nd year
Semester	4th semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	In the process of studying the discipline, students will analyze the role and place of standardization in the general system of creation and management of biotechnological enterprises. They will become familiar with modern theoretical, regulatory, and methodological foundations of standardization and certification, including the specifics of organizing standardization work and the general requirements for the content of regulatory documents concerning biotechnological products and productions. The acquired system of knowledge, combined with developed practical skills, will enable students to effectively conduct ecological certification of the quality of biotechnological products and services of biotechnological enterprises.

EXAMINATION OF BIOTECHNOLOGICAL PROCESSES AND EQUIPMENT

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Doctor of Biological Sciences, Professor **Liudmyla Hrytsak**
Course Language	Ukrainian
Department	General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	2nd year
Semester	4th semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	During the course, students will become acquainted with various approaches, algorithms, and methods for conducting expert assessment of biotechnological processes and equipment. The obtained basic knowledge will allow them to evaluate the safety of all biotechnological compounds used either as “molecular machines” in biosynthesis processes or as final products of biotechnological production; to scientifically justify the selection and application of specific expert methodologies depending on the type of biotechnological process and equipment used in its implementation. All this, in combination, will form a system of knowledge, abilities, and skills necessary for evaluating the main indicators of quality and safety of biotechnological products (food, pharmaceutical, agricultural, etc.) and the technologies for their production.

MYCOLOGY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	**Ruslan Yavorivsky**
Course Language	Ukrainian
Department	Botany and Zoology
Scope	3 ECTS credits
Year of Study	2nd year
Semester	4th semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The main purpose of teaching the academic discipline *"Mycology"* is to acquaint students with the principles of distinguishing fungi as a separate kingdom, the peculiarities of their systematic position, classification, life cycles, significance in nature and human life, and phylogeny. Within the course, the development of ideas about fungi and their place in the system of the organic world is considered; the diversity of thallus types and their modifications (vegetative and reproductive), cytological and physiological-biochemical characteristics of various fungal groups are studied, as well as the diversity of types of genetic recombination and life cycles. The aim of the course is for students to acquire basic knowledge of the morphology, cytology, plectology, biology, physiology, and genetics of fungi, as well as the principles of their classification.

ALGOLOGY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	**Ruslan Yavorivsky**
Course Language	Ukrainian
Department	Botany and Zoology
Scope	3 ECTS credits
Year of Study	2nd year
Semester	4th semester
Form of Final Assessment	test
Link to Syllabus	
Course Description	The main purpose of teaching the academic discipline *"Algology"* is to acquaint students with the history of the science, morphology, ultrastructure, ontogenesis, systematics, and ecology of algae. Within the course, students obtain knowledge of the cytology, genesis, life cycles, and systematics of algae, based on data from electron microscopy, new principles of algal cultivation, parallelism in their evolution, and the phylogenetic relationships of divisions and taxa within them. In the course of study, students should know the diversity of the world algal flora, the characteristic features of the structure and diagnostic traits of algae, the pathways of their evolutionary development, the phylogenetic relationships between individual groups of organisms, the characteristic features of the morphological and anatomical structure of sporophytes and gametophytes of the main taxa of algae, their life cycles, and the regularities of progressive evolution.

ENZYMOLOGY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Doctor of Biological Sciences, Professor **Oksana Stoliar**
Course Language	Ukrainian
Department	Chemistry and Methods of Teaching Chemistry
Scope	3 ECTS credits
Year of Study	2nd year
Semester	2nd semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The aim of the course is to elucidate the mechanisms of catalytic processes in living organisms and to master practical skills for their investigation. The course covers knowledge about the structure, mechanism of action, properties (including regulation under physiological conditions and during correction of pathological processes), and kinetics of enzymatic processes, as well as the classification of enzymes. The course also includes information about ribozymes as catalysts of RNA splicing and peptide bond synthesis. Accordingly, it forms an understanding of the evolution of biological catalysis. The course enhances the knowledge acquired during the study of biological chemistry and is based on an understanding of metabolic processes, their integration, and regulation. Enzymology substantiates the efficiency of enzyme use in biotechnologies due to their high activity, specificity, and environmental compatibility, as well as their application in diagnostics and therapy of pathological conditions.

3rd year of study

GENERAL PHYTOPATHOLOGY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Biological Sciences, Associate Professor **Oksana Matsiuk**
Course Language	Ukrainian
Department	Department of Botany and Zoology
Scope	3 ECTS credits
Year of Study	3rd year
Semester	5th semester
Form of Final Assessment	test
Link to Syllabus	
Course Description	The study of the discipline *"General Phytopathology"* ensures the formation of students' knowledge about the main types of plant diseases, their causative agents, and the measures to control them. The main objectives of the course include: studying the symptoms of plant diseases; the etiology (causes) of plant diseases; the biological characteristics of plant pathogens; interactions between organisms living on or feeding on plant tissues (fungi, bacteria, viruses, insects, nematodes); and various methods of plant disease control. Students acquire techniques and methods for independently identifying plant disease pathogens, soil microorganisms, microbial antagonists, and microbes producing antibiotic substances used for plant protection.

ENVIRONMENTAL IMPACT ASSESSMENT

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Geographical Sciences, Associate Professor **Iryna Barna**
Course Language	Ukrainian
Department	Department of Geoecology and Methods of Teaching Environmental Disciplines
Scope	3 ECTS credits
Year of Study	3rd year
Semester	6th semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The course *"Environmental Impact Assessment"* aims to familiarize students with the methodological, legal, and procedural foundations of environmental impact assessment (EIA), as well as the specifics of its practical implementation in Ukraine and other countries. It also seeks to develop skills in applying environmental and legal norms within the EIA process and to enhance students' understanding of preventive environmental protection measures. Students' work on course topics includes practical tasks focused on mastering methods for organizing EIA procedures, developing the skills needed to act as environmental specialists within authorized EIA bodies responsible for conducting assessments and public consultations, and as environmental executors preparing EIA documentation.

BIOINDICATION OF AQUATIC ECOSYSTEMS

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's)
Lecturer	Doctor of Biological Sciences, Professor **Oksana Bodnar**
Course Language	Ukrainian
Department	General Biology and Methods of Teaching Natural Sciences Disciplines
Scope	3 ECTS credits
Year of Study	3rd year
Semester	5th semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The course focuses on acquiring theoretical knowledge and practical skills in organizing, planning, and conducting bioindication studies of the ecological state of water bodies. Students become familiar with methods for assessing technogenic (industrial, agrochemical, domestic, biogenic) pollution and the sanitary-biological condition of hydroecosystems through observations of biological organisms, using changes in physiological and biochemical parameters of bioindicator species.

BIOINDICATION AND BIOTESTING OF SOILS

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Biological Sciences, Associate Professor **Halyna Humeniuk**
Course Language	Ukrainian
Department	General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	3rd year
Semester	5th semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The aim of the course is to form an understanding of the ecological foundations of bioindication research, the use of animals, plants, and microorganisms as bioindicators, and the joint biological effects of physicochemical factors of edaphotopes on the environment. Students also study biological methods for soil quality assessment, the theoretical and practical applications of biotesting methodology, and biological diagnostics of soils to determine the nature and degree of anthropogenic impact on soil cover at early stages of degradation processes.

BIOTECHNOLOGICAL ANALYTICAL SYSTEMS

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Biological Sciences, Associate Professor **Andrii Hertz**
Course Language	Ukrainian
Department	General Biology and Methods of Teaching Natural Sciences Disciplines
Scope	3 ECTS credits
Year of Study	3rd year
Semester	6th semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The purpose of this course is to introduce students to modern methods and tools of analysis in biotechnology, including molecular biology, biochemical, and bioinformatic techniques. The course covers theoretical topics such as the fundamentals of genetic analysis, proteomics, metabolomics, and the use of spectroscopic, potentiometric, and chromatographic methods in biotechnological research. Students will learn to develop and optimize analytical methods used to study biological systems and processes. Special attention is given to the practical application of theoretical knowledge through laboratory work and project-based learning. The course also includes the study of ethical and legal aspects of biotechnological research, providing students with a comprehensive understanding of contemporary challenges and trends in this field. This will allow students not only to develop professional skills but also to think critically and evaluate the impact of biotechnology on society and the environment.

BIOTECHNOLOGY OF MEDICINAL PLANTS

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Biological Sciences, Associate Professor **Mariana Prokopiak**
Course Language	Ukrainian
Department	Botany and Zoology
Scope	3 ECTS credits
Year of Study	3rd year
Semester	6th semester
Form of Final Assessment	test
Link to Syllabus	
Course Description	The course focuses on understanding the physiological and biochemical characteristics of medicinal plant cells under *in vitro* cultivation, methods of obtaining high-performance cell strains, and their use for producing biologically active substances (BAS). Students study the chemical composition of medicinal plants and identify their therapeutic properties. Attention is given to the influence of *in vitro* cultivation conditions on the accumulation of secondary metabolites, the biosynthesis of alkaloids, glycosides, and other substances in plant tissue cultures, and the pharmacological properties of preparations derived from *in vitro* biomass. The course introduces promising trends in medicinal plant biotechnology and provides practical skills in preparing and selecting nutrient media compositions for *in vitro* plant tissue and cell cultivation, as well as selecting appropriate phytohormones. Students also learn about the development of medical preparations based on medicinal plant materials obtained through biotechnological methods.

PLANT IMMUNITY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Pedagogical Sciences, Associate Professor **Natalia Moskaliuk**
Course Language	Ukrainian
Department	Botany and Zoology
Scope	3 ECTS credits
Year of Study	3rd year
Semester	6th semester
Form of Final Assessment	Test
Link to Syllabus	
Course Description	The course *"Plant Immunity"* ensures that undergraduate students acquire the knowledge, skills, and competencies necessary to understand global ecological challenges, recognize ecological factors, and evaluate their impact on humans and the environment. Bachelors in *Ecological Biotechnology* should not only possess the required professional competencies but also be capable of efficiently and environmentally safely protecting agricultural, medicinal, ornamental crops, and forest plantations. The purpose of the course is to provide students with knowledge of the theoretical foundations of plant immunity to diseases and pests and to develop practical skills in its application. The subject of the discipline includes systems for disease prevention and control, as well as methods of breeding plants for resistance to diseases and pests.

MATHEMATICAL MODELING AND OPTIMIZATION OF BIOTECHNOLOGICAL PROCESSES

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Biological Sciences, Associate Professor **Halyna Humeniuk**
Course Language	Ukrainian
Department	General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	3rd year
Semester	6th semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The goal of studying this discipline is to develop students' scientific worldview regarding biotechnological methods and their practical application, as well as to provide a fundamental understanding of modeling biological processes and systems of various levels of organization for further use in research. Students learn to apply modern computational tools to determine key parameters and visualize model solutions.

MODELING AND FORECASTING OF ENVIRONMENTAL CONDITIONS

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Biological Sciences, Associate Professor **Halyna Humeniuk**
Course Language	Ukrainian
Department	General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	3rd year
Semester	6th semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The aim of the course is to form a system of knowledge on the methodology and tools for modeling natural systems and environmental management systems, analyzing and applying them to understand pollutant dispersion laws and to use modern mathematical models for predicting the state of artificial and semi-natural ecosystems.

FUNDAMENTALS OF BIOINDICATION AND BIOTESTING

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Biological Sciences, Associate Professor **Halyna Humeniuk**
Course Language	Ukrainian
Department	General Biology and Methods of Teaching Natural Sciences
Scope	3 ECTS credits
Year of Study	3rd year
Semester	5th semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The purpose of this course is to study the regularities of biological responses to environmental stressors used in biological monitoring. Students acquire knowledge of the principles and methods of biomonitoring and biotesting, master the techniques for testing natural and anthropogenically transformed ecosystems, and apply methodological foundations of biological research. The course provides training in using modern equipment and computational tools, as well as developing the ability to apply acquired knowledge and skills in agricultural production.

ENVIRONMENTAL IMPACT ASSESSMENT

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Geographical Sciences Associate Professor **Iryna Barna**
Course Language	Ukrainian
Department	Geology and Methods of Teaching Environmental Disciplines
Scope	3 ECTS credits
Year of Study	3rd year
Semester	6th semester
Form of Final Assessment	test
Link to Syllabus	
Course Description	The course *"Environmental Impact Assessment"* aims to familiarize students with the methodological, legal, and procedural foundations of environmental impact assessment (EIA), as well as the specifics of its practical implementation in Ukraine and other countries. It also seeks to develop skills in applying environmental and legal norms within the EIA process and to enhance students' understanding of preventive environmental protection measures. Students' work on course topics includes practical tasks focused on mastering methods for organizing EIA procedures, developing the skills needed to act as environmental specialists within authorized EIA bodies responsible for conducting assessments and public consultations, and as environmental executors preparing EIA documentation.

FORECASTING OF AGRICULTURAL CROP DISEASES

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Pedagogical Sciences, Associate Professor **Natalia Moskaliuk**
Course Language	Ukrainian
Department	of Botany and Zoology
Scope	3 ECTS credits
Year of Study	3rd year
Semester	5th semester
Form of Final Assessment	Credit
Link to Syllabus	
Course Description	The course "Forecasting the Development of Agricultural Crop Diseases" aims to equip undergraduate students with the knowledge, skills, and professional competencies necessary for effective and environmentally safe protection of agricultural, medicinal, and ornamental crops, as well as forest plantations, from harmful organisms and diseases. The main goal is to develop students' ability to assess disease spread and development, determine the feasibility of implementing protective measures, and evaluate the phytosanitary condition of crops. The subject of the course includes the study of crop diseases and the methods of their control.

SYSTEMIC ANALYSIS OF ENVIRONMENTAL QUALITY

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Geographical Sciences, Associate Professor **Iryna Barna**
Course Language	Ukrainian
Department	of Geoecology and Methods of Teaching Environmental Disciplines
Scope	3 ECTS credits
Year of Study	3rd year
Semester	6th semester
Form of Final Assessment	test
Link to Syllabus	
Course Description	The course *"System Analysis of Environmental Quality"* provides students with the ability to apply interdisciplinary approaches to critically evaluate environmental issues, use principles and methods of research and innovation, and apply new analytical and forecasting techniques for complex phenomena. Students learn to assess the level of negative impact of natural and anthropogenic factors on the environment and humans, based on knowledge of general systems theory, stages and methods of system analysis, system modeling, and applied aspects of using system analysis to ensure environmental quality. The course also includes practical assignments focused on mastering information support tools for system analysis, the methodology for environmental protection, and algorithms for operating automated systems for monitoring the state and quality of environmental components.

PLANT RESISTANCE TO BIOTIC STRESSORS

Educational program	Environmental Biotechnology
Specialty	162 Biotechnology and Bioengineering
Higher Education Level	First (bachelor's) level
Lecturer	Candidate of Pedagogical Sciences, Associate Professor **Natalia Moskaliuk**
Course Language	Ukrainian
Department	Botany and Zoology
Scope	3 ECTS credits
Year of Study	3rd year
Semester	5th semester
Form of Final Assessment	credit
Link to Syllabus	
Course Description	The course *"Plant Resistance to Biotic Stressors"* ensures that undergraduate students acquire knowledge, skills, and professional competencies relevant to modern environmental and agricultural challenges. Bachelors in *Ecological Biotechnology* must be prepared to address production tasks related to the cost-effective and environmentally safe protection of agricultural, medicinal, ornamental plants, and forest ecosystems. The aim of the course is to study the fundamentals of plant resistance to biotic stressors, the functioning of plant organisms, and their regulatory mechanisms. The subject of the discipline covers the study of plant organism functions, their organs, tissues, cells, and cellular components, their interactions, regulation, and adaptation to biotic stressors, as well as their development during ontogenesis.