

REPUBLIC OF AZERBAIJAN MINISTRY OF EDUCATION

Approved by Decision No. ____
of the Ministry of Education
of the Republic of Azerbaijan
dated ____ ____, 2020

**ACADEMIC PROGRAM
IN THE FIELD OF SPECIALIZATION AT THE BACHELOR'S LEVEL**

Specialization (Program) Code and Title: **050504 – Ecology**

BAKU – 2020

BACHELOR EDUCATION PROGRAM IN THE SPECIALTY OF “ECOLOGY”

1. General Provisions

1.1. The Bachelor Education Program for the specialty 050504 – *Ecology* (hereinafter referred to as the *Program*) is developed in strict compliance with the Law of the Republic of Azerbaijan on Education, relevant resolutions of the Cabinet of Ministers of the Republic of Azerbaijan, and the Classification of Specialties (Programs) for Bachelor’s Degree level education.

1.2. The primary objectives of the Program are to:

- Define the competencies of graduates within the specialty, establish the scope of the specialty, specify teaching and learning methodologies for individual courses, outline assessment procedures, enumerate expected learning outcomes, and determine the infrastructural and human resource requirements necessary for delivering quality education;
- Inform both students and prospective employers about the knowledge, skills, and competencies acquired by graduates, as well as the learning outcomes achieved;
- Provide guidance to evaluators and experts engaged in the assessment of the alignment between the educational training and the Program standards.

1.3. This Program is mandatory for all higher education institutions operating in the Republic of Azerbaijan that offer bachelor-level training in the specified specialty, irrespective of their administrative subordination, ownership form, or legal status.

1.4. Under a standard five-day academic week, the total weekly workload for students, inclusive of both contact hours and independent study, amounts to 45 hours (with exceptions made for specialized higher education institutions). The proportion of classroom-based hours shall not exceed 50% of the total weekly workload. The overall weekly workload may be adjusted in consideration of the particular characteristics and requirements of the specialty.

2. Graduate Competencies

2.1. General Competencies

By the end of the Education Program, the graduate is expected to acquire the following general competencies:

- Proficiency in oral and written communication in Azerbaijani within the scope of the specialty;
- Ability to communicate in at least one foreign language relevant to the specialty;
- Comprehensive and systematic knowledge of the historical, legal, political, cultural, and ideological foundations of the Azerbaijani statehood, as well as its role and position in the contemporary world; ability to forecast the prospective development of the national state;
- Capability to identify threats and challenges faced by the national state;
- Competence in utilizing information technologies in the workplace;
- Ability to work collaboratively in teams and to achieve a shared approach to problem-solving;
- Adaptability to new conditions, initiative-taking, and a strong drive to succeed;
- Ability to identify and select additional information resources necessary for problem resolution;
- Skills to analyze, synthesize, and apply relevant information for professional purposes;
- Capacity to plan and organize professional activities, enhance current skills, pursue further education, manage time efficiently, and meet deadlines;
- Commitment to social and ecological responsibility, civic awareness, ethical conduct, and prioritizing quality in work;
- Self-assessment and critical thinking skills aimed at continuous knowledge and skill development.

2.2. Professional Competencies

Upon completion of the Program, the graduate shall possess the following specialized competencies:

- Mastery of fundamental mathematical concepts essential to the specialty, enabling mathematical and statistical processing of research data;

- Foundational knowledge and practical skills in the necessary segments of physics and chemistry pertinent to the specialty;
- Ability to apply fundamental mathematical methods for ecological data processing and analysis;
- Solid grounding in the physical, chemical, and biological bases of ecology, including competence in chemical and ecological analysis techniques; proficiency in geographic and biological analysis methods; skills in biodiversity identification, description, and contemporary evaluation techniques;
- Understanding of theoretical and applied geography, including the composition, structure, and developmental regularities of the Earth's geographic layers, origin and evolution of the planet, principles of mineral deposits, and major relief forms of the Earth's surface;
- Knowledge of soil genesis, structure, composition, and properties; understanding of eco-geographical processes at cosmic and planetary scales; laws governing soil distribution; soil fertility formation, development, and its interaction with the environment; methods for effective agricultural and economic utilization of soil resources; and soil fertility enhancement and restoration techniques;
- Familiarity with general ecology, geographical ecology, human ecology, social ecology, and theoretical foundations of environmental protection, providing a broad interdisciplinary ecological perspective;
- Comprehensive understanding of biological principles, interrelations between biology and other sciences, cellular organization of living organisms, physico-chemical processes within cells, laws of genetic information transfer, anatomy and physiology of plants and animals, complex human organism structure and functions, laws governing biological processes, and the role of humans in nature and society;
- Knowledge of the significance of organism-level organization within living systems, complexities of biotic and abiotic interactions, key ecological factors, habitats, organismal adaptations, fundamental laws of organism-environment interactions, population structure and dynamics, survival

strategies, biosphere evolution, sustainability conservation, and self-regulation and productivity laws of living systems;

- Understanding of ecological groups of animals, their ecological niches across terrestrial and aquatic biomes, morphological, physiological, and ethological traits of organisms from prokaryotes to eukaryotes, biodiversity of fauna, and its significance to humans;
- Insight into plant life forms, main biotic and abiotic stress factors, ecological groups shaped by these stresses, phytocoenosis dynamics, demographic ecology of invasive species, geographic patterns of plant species and communities distribution, endemic and relict flora of Azerbaijan, their ecology, conservation status, and protection measures;
- Awareness of global biodiversity concepts, high civic responsibility for life preservation on Earth, functions and values of biological diversity, biodiversity levels, monitoring and mapping of biodiversity, causes of biodiversity loss, conservation strategies, and both continental and Azerbaijan-specific biodiversity knowledge;
- Understanding of Earth's geospheres and their processes, planetary metabolism, pollutants, their sources and biospheric distribution, permissible concentrations of contaminants, main pollutant groups, migration, transformation, and accumulation of pollutants in ecosystems, mechanisms of environmental factors' influence on organisms, environmental stress adaptation, and effects of various pollutants on organisms, biocenosis, and human health;
- Knowledge of quantitative characteristics of separation and concentration methods, extraction techniques and applications, sources of heavy metals emissions, forms of heavy metals in aquatic ecosystems, factors affecting their toxicity, substance determination methods, mathematical evaluation of analytical results, accuracy, precision, selectivity, and error analysis;
- Understanding of chemical reactions occurring in the atmosphere and hydrosphere, greenhouse gases and their roles in the atmosphere, gas content in natural waters, aerobic and anaerobic processes in natural waters, microcomponents in precipitation, causes and consequences of acid

rain, physical-ecological properties of water, chemical pollution of natural waters, chemical-ecological monitoring of hydroecosystems, methods of air pollution control, and wastewater treatment technologies;

- Familiarity with living, biogenic, and biocosmic substances, interactions of living organisms with biospheric components, large and small biogeochemical cycles, functions of living matter in the biosphere, biosphere transformation into noosphere, comparison between biosphere and technosphere, principles and ecological significance of waste-free production.
- Knowledge of major global environmental problems; fundamental laws governing the interactions between living organisms and nature; the impact of pollutants on the environment and their migration within the biosphere; key environmental quality standards; principles of rational use of natural resources and environmental protection; methods for treatment and recycling of industrial and household waste; and the principles of organizing waste-free and resource-conserving production systems;
- Understanding of toxic substances classification, manifestations of poisoning, changes occurring in the circulatory system, polycyclic aromatic hydrocarbons, dioxins, causes of environmental contamination by hydrocarbons, food poisoning, mycotoxins, aflatoxins, bacterial toxicoses and toxic infections; principles of hygienic normalization of chemical substances and ecosystem status; and ecological certification of food products;
- Familiarity with descriptive methods for ecological mapping; basic features of geographic information systems (GIS); software and hardware tools in GIS for ecological monitoring; the use of remote sensing images in environmental studies; and comprehensive environmental assessment utilizing GIS capabilities;
- Understanding the reciprocal relationship between society and nature; the foundations of environmental law which ensure efficient use and protection of natural resources; legal principles of sustainable use of natural resources;

and the ecological and legal responsibilities related to sustainable natural resource management;

- Knowledge of landscape types, dynamics, and laws governing their evolutionary stages; limits of landscape disturbance; the place of landscapes within the biosphere; calculation of ecological capacity of landscapes; landscape resistance to anthropogenic impacts; and the use of remote sensing and modern computer programs in landscape research;
- Understanding the cosmic and planetary features of ecogeographical processes; regional and local characteristics and interrelations of ecogeographical processes; ecosystem functions, dynamics, geochemical and geophysical properties; optimization of ecosystem utility to society; fundamentals of modern ecology and classical bioecology; and the role of living matter in the biosphere;
- Fundamentals of sustainable development; environmental impact assessment; legal bases of environmental protection and natural resource use; ability to comprehend, explain, and critically analyze foundational data in ecology and natural resource use;
- Theoretical foundations of ecological monitoring, environmental pollution, technogenic systems, ecological risk reduction, and normalization; and ability to apply theoretical knowledge in practical activities;
- Competence in applied ecology, ecological mapping, environmental expertise, and monitoring methods; ability to analyze and synthesize results from field and laboratory experiments; develop methodologies; and apply theoretical knowledge in practice.

3. Structure of the Education Program

3.1. The Education Program comprises 240 ECTS credits over 4 years. The credits are distributed as follows:

Number of Courses	Course Title	ECTS credits
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General Courses

1.	<p>History of Azerbaijan</p> <p>The teaching of this course aims to consolidate knowledge of Azerbaijan's history by grouping it according to historical space, time periods, statehood, notable figures, economy, and cultural content lines, and effectively conveying this to the younger generation. It seeks to provide students with a profound understanding of the historical past of our homeland, to develop historical thinking skills, and to cultivate the ability to objectively evaluate events occurring in society. Special attention is given to fostering the ideology of statehood, respect for the past, confidence in the future, and nurturing patriotism among youth through the acquisition of these knowledge and skills.</p>	5
2.	<p>Business and Academic Communication in Azerbaijani</p> <p>Within this course, special emphasis is placed on developing students' abilities to deliver presentations, public speaking, and academic as well as business writing skills in the Azerbaijani language.</p>	4
3.	<p>Business and Academic Communication in a Foreign Language</p> <p>This course focuses on developing students' skills in delivering presentations, public speaking, academic and business writing, as well as oral and written communication in one of the foreign languages relevant to their field of study.</p>	15
	Elective Courses	

4.	Philosophy	3
	Sociology	
	Constitution of the Republic of Azerbaijan and Fundamentals of Law	
	Logic	
	Ethics and Aesthetics	
	Introduction to Multiculturalism	
5.	Application of Information Technologies in Ecology	3
	Information Management and Database Development	
	Fundamentals of Entrepreneurship and Introduction to Business	
	Political Science	
	Specialized Courses	
6.	<p>Chemistry</p> <p>Within the framework of this course, special emphasis is placed on developing students' abilities to understand the composition, structure, and properties of chemical substances, as well as to determine the effects of various factors on chemical reactions and transformations.</p>	6
7.	<p>Biology</p> <p>This course places particular emphasis on equipping students with the ability to understand the interconnections between biology and other sciences, as well as to comprehend the cellular structure of living organisms and the physicochemical processes occurring within them.</p>	6

8.	<p>Higher Mathematics</p> <p>This course focuses on developing students' abilities to perform mathematical calculations based on ecological research results and to conduct statistical processing of research data.</p>	7
9.	<p>Biosphere and Its Protection</p> <p>This course aims to develop students' abilities to identify living, biogenic, and biocosmic substances, as well as to understand the interactions between living organisms and the components of the biosphere.</p>	6
10.	<p>Physics</p> <p>This course focuses on developing students' abilities to analyze phenomena occurring within physical bodies or involving them from a physical perspective.</p>	4
11.	<p>Fundamentals of Earth Sciences</p> <p>This course aims to equip students with the ability to understand the origin, composition, structure, and dynamics of the Earth, as well as its developmental history. Special emphasis is placed on the skills required to identify the genesis of mineral resources and the principles governing their spatial distribution.</p>	6
12.	<p>General Ecology</p> <p>Within this course, students are trained to comprehend the significance of the organization of living systems at the organism level, the complexity of interactions between biotic and abiotic components, and the understanding of humanity's role within ecological systems and the biosphere as a whole.</p>	5
13.	<p>Geographical Ecology</p> <p>This course focuses on developing students' skills to determine the function, dynamics, and geochemical and geophysical</p>	4

	characteristics of ecosystems, emphasizing their structure and environmental interactions.	
14.	<p>Animal Ecology</p> <p>This course is designed to develop students' abilities to identify the morphological, physiological, ethological, and other characteristics of organisms as they adapt to various environmental conditions. Special emphasis is placed on understanding organismal adaptations within ecological contexts.</p>	5
15.	<p>Soil Science</p> <p>Within this course, students gain the skills to determine the formation and development of soil fertility, which is a fundamental soil property, by analyzing its interactions with the surrounding environment.</p>	4
16.	<p>Ecological Research Methods</p> <p>This course focuses on imparting knowledge about classical and instrumental research methods, the use of analytical instruments, and the significance and applications of chemical analysis in ecological studies.</p>	5
17.	<p>Landscape Science and Landscape Ecology</p> <p>Students are trained to identify types of landscapes, their dynamics, and the principles governing their evolutionary stages. Emphasis is placed on understanding landscape patterns and processes from an ecological perspective.</p>	5
18.	<p>Human Ecology and Sustainable Development</p> <p>This course aims to develop students' ability to understand key ecological issues concerning human-environment interactions, the opportunities and challenges of sustainable development for nature and society, and the primary problems associated with transitioning to sustainability.</p>	5

19.	<p>Air and Water Quality, Pollution, and Protection</p> <p>This course focuses on developing students' abilities to understand chemical reactions occurring in the atmosphere, the gas composition of natural waters, aerobic and anaerobic processes in natural waters, and issues related to drinking water quality.</p>	6
20.	<p>Environmental Law</p> <p>Within this course, students acquire skills to identify and interpret the legal norms of the Republic of Azerbaijan concerning environmental protection, including both legal and non-legal forms of environmental safeguarding.</p>	4
21.	<p>Ecological Cartography and Geographic Information Systems (GIS)</p> <p>This course emphasizes developing students' competencies in utilizing geographic information systems for comprehensive environmental studies and spatial analysis.</p>	8
22.	<p>Industrial Ecology</p> <p>Students are trained to determine the fundamental methods of rational natural resource use and environmental protection, as well as principles for organizing waste-free and resource-conserving production.</p>	4
23.	<p>Environmental Chemistry</p> <p>This course is designed to equip students with the ability to identify major groups of pollutants, their migration, transformation, and accumulation in ecosystems, as well as the specific effects of various pollutants on organisms, biocenoses, and the human body.</p>	6

24.	<p>Forestry</p> <p>This course aims to develop students' abilities to determine the role of forest ecosystems in shaping the ecological environment and to understand the scientific principles underlying forest management practices.</p>	6
25.	<p>Ecological Monitoring</p> <p>Within this course, students gain skills to identify the characteristics of monitoring biodiversity of plants and animals in nature, as well as methods and techniques of eco-analytical control.</p>	5
26.	<p>Biodiversity Conservation</p> <p>This course focuses on equipping students with the ability to understand the functions and value of biological diversity, the different levels of biodiversity, and contemporary approaches to its assessment and conservation.</p>	6
27.	<p>Sustainable Management of Natural Resources</p> <p>Students are trained to comprehend the principles of efficient use and protection of natural resources, as well as the ecological and legal frameworks governing their utilization.</p>	4

28.	<p>Civil Defense</p> <p>This course aims to equip students with the ability to understand the protection of the population during emergencies, to raise awareness of civil defense among the public, and to determine the fundamentals of assessing the resilience and operational continuity of industrial facilities in emergency situations.</p>	3
		120
	Elective Courses Determined by the Higher Education Institution	60

Internship and Graduation Thesis

	Internship	21
	Graduation Thesis	9
Total:		30
Overall:		240

4. Teaching and Learning

4.1. The teaching and learning environment must be organized in such a way that students can achieve the intended learning outcomes of the educational program.

4.2. Teaching and learning methods should be described in relevant documents (e.g., the instructor's syllabus, etc.) and be accessible to the public (e.g., on the university website, program brochures, etc.).

4.3. Teaching and learning methods must be continuously reviewed and improved, taking into account innovative educational practices. Regular improvement of teaching and learning methods should be part of the university's quality assurance system.

4.4. Different teaching methods should be used in the educational process. These methods must promote a student-centered approach and encourage students' active participation in the learning process. Examples of teaching and learning methods include:

- Lectures, seminars, practical assignments;
- Presentations and discussions, debates;
- Independent work/research (e.g., working with practical examples);
- Projects;
- Problem-based learning;
- Fieldwork;

- Role-playing;
- Reports;
- Group assessment;
- Expert method;
- Video and audio conferencing technologies;
- Video and audio lectures;
- Distance education;
- Simulations etc.

4.5. A balance between theoretical education and practical training should be maintained. The main focus should be on strengthening practical skills in accordance with the changing needs of the labor market.

4.6. (Repeated) A balance between theoretical education and practical training should be maintained. The main focus should be on strengthening practical skills in accordance with the changing needs of the labor market.

5. Assessment

5.1. Assessment must be organized to effectively measure students' achievement of the expected learning outcomes. It should enable monitoring progress, evaluating the extent to which educational program outcomes are achieved, facilitate dialogue with students, and help form initial conditions for program improvement.

5.2. Assessment methods should be described in relevant documents (e.g., course syllabus, program documentation) and be accessible to everyone (e.g., on the university website, program brochures, etc.).

5.3. Assessment methods must be continuously reviewed and improved in light of innovative teaching practices. Regular updating of assessment methods should be part of the higher education institution's quality assurance system.

5.4. Different assessment methods should be used in the teaching process. These methods must promote a student-centered approach and encourage students' active participation in the learning process. Examples of assessment methods include:

- Written assignments;
- Tests on knowledge and skills, computer-based tests;
- Oral presentations;
- Surveys;
- Open discussions;
- Practical and fieldwork reports;
- Assessment of skills based on observations in practice and laboratory;
- Project reports;
- Portfolio assessment;
- Frontal questioning;
- Group and self-assessment etc.

5.5. Methods used to assess learning achievements should be based on clearly defined criteria and allow for accurate and reliable determination of the level of knowledge, skills, and abilities acquired by the student during the study period. During the evaluation of learning outcomes, teachers must adhere to principles of transparency, impartiality, mutual respect, and humanism.

5.6. Students must be given the opportunity to discuss all aspects of their education, including the assessment process, with teachers/assessors. The higher education institution must establish an appeal procedure related to the assessment process or grades.

5.7. Academic ethics plays an important role in the educational process. Students are taught to adhere to academic integrity and understand plagiarism issues. They must be informed about intellectual property rights.

6. Learning Outcomes of the Program and Each Course

6.1. Determining the learning outcomes of the educational program and each course, as well as preparing the syllabus for each course, is the responsibility of the higher education institution/academic staff.

6.2. Learning outcomes are defined by each higher education institution according to the form in Annex 1. The matrix of learning outcomes (Annex 2) should reflect the relationship between courses and learning outcomes.

6.3. To ensure that the educational program meets the changing needs of society and the labor market with theoretical and practical content, course syllabi must be regularly updated.

7. Infrastructure and Human Resources

7.1. The teaching, learning, and assessment process of the educational program requires the higher education institution to have the following infrastructure:

- Lecture halls equipped with appropriate equipment;
- Teaching and research laboratories equipped with devices and reagents for training and research in various fields of ecology;
- Computer rooms equipped with modern software;
- Rooms for group work and practical classes;
- Library rooms with access to electronic libraries, scientific databases, and local internet networks.

7.2. Academic staff of higher education institutions generally hold academic degrees. Personnel from other state or private institutions and/or relevant organizations may also be involved in teaching.

8. Internship (Practical Training)

8.1. Internship is important for the practical application of theoretical knowledge and the strengthening of professional skills.

8.2. Internships may be organized at private companies, state institutions, research laboratories (including universities, the Azerbaijan National Academy of Sciences, private local or international organizations and companies, etc.).

8.3. Before the internship, a contract must be signed between the higher education institution and the company/institution/laboratory where the internship will take place. At the same time, based on the student's individual request, permission may be granted for the internship to be completed at another company/institution/laboratory relevant to the student's specialization, including abroad. The contract shall specify the conditions, rights and obligations of the students, and other necessary details.

8.4. The evaluation of the internship is based on the student's presentation of a report about their internship before a commission. The commission is formed with the participation of experts from the relevant departments of the faculty where the student studies.

9. Graduation Thesis

9.1. The educational program is completed with a graduation thesis.

9.2. The graduation thesis should be an independent scientific-methodological research conducted by the student, the content of which is based on new facts or the generalization of known propositions from a different scientific perspective, and should prove the practical significance of the proposed propositions. The thesis must be defended before an appropriate commission organized with the participation of leading faculty professors and invited leading specialists from potential employers of graduates.

10. Employment and Lifelong Learning

10.1. Graduates of this program may work in private organizations, companies, state institutions, scientific research institutes, laboratories and centers requiring deep ecological knowledge, universities, as well as in fields that demand innovation and other transversal competencies relevant to their specialization.

10.2. The higher education institution must conduct regular surveys regarding the employment of program graduates and publish information about vacant job positions on its website.

10.3. Graduates of the bachelor's program may continue their education in Master's programs in Ecology, Ecological Engineering, and other relevant specialties.

10.4. The knowledge, skills, and approaches acquired during the education are the foundational conditions for graduates to independently pursue lifelong learning.

Razılaşıdırılmışdır:

Azərbaycan Respublikası Təhsil
Nazirliyinin Aparat rəhbərinin müavini,
Elm, ali və orta ixtisas təhsil şöbəsinin müdiri


Yaqub Piriye

"28" 07 2020-ci il

Təbiət ixtisasları qrupu üzrə Dövlət
Təhsil Proqramlarını hazırlayan
işçi qrupun sədri


Hüseyin Məmmədov

"27" 07 2020-ci il



Learning Outcomes of the Educational Program and Courses

Program Learning Outcomes (PLOs)
PLO 1. Demonstrates proficiency in professional and academic communication in Azerbaijani and foreign languages; identifies additional information resources for problem-solving, analyzes, synthesizes, and presents relevant information; processes and presents results obtained from field and laboratory research.
PLO 2. Exhibits comprehensive and systematic knowledge of the historical, legal, political, cultural, and ideological foundations of Azerbaijani statehood, as well as its role and position in the modern world; demonstrates the ability to forecast the country's developmental prospects and protect Azerbaijan's interests in the international arena.
PLO 3. Demonstrates social and environmental responsibility, civic awareness, and ethical behavior; prioritizes quality and shows the ability to self-assess and engage in self-criticism for continuous personal and professional development.
PLO 4. Applies theoretical knowledge from relevant branches of physics, mathematics, and chemistry to explain and investigate various phenomena, employing modern physical and chemical approaches and methods.
PLO 5. Demonstrates up-to-date knowledge of the interactions between living organisms and their environment, the structure and composition of environmental components, ecochemical, ecogeographical, and bioecological characteristics, biodiversity conservation, and implementation of nature protection measures.
PLO 6. Exhibits current knowledge regarding classification of pollutants, their migration, routes of entry into organisms, resulting effects, methods for identification and separation of substances, characteristics of air and water layers, pollution sources, roles of living matter in the biosphere, cycles of chemical elements, environmental quality, and sustainable use of natural resources.

PLO 7. Demonstrates understanding of the Earth’s properties, the use of geographic information systems (GIS) in comprehensive environmental studies, and current knowledge on the utilization and legal regulation of natural resources.

PLO 8. Demonstrates knowledge of factors affecting living conditions, causes of biodiversity loss and its conservation, impacts of various factors on human health, and environmental quality monitoring.

PLO 9. Proposes new ideas, identifies fundamental problems, defines research objectives and methods; applies modern experimental techniques (such as observation, recording, identification, collection handling, comparative analysis, classification, and ecological status assessment) to environmental objects and organisms in field and laboratory settings.

PLO 10. Demonstrates knowledge of civil defense awareness during emergencies, organization and implementation of emergency response and mitigation measures; proficiently uses personal and collective protective equipment.

Learning Outcomes for the Course “History of Azerbaijan” (CLOs)

CLO 1. Demonstrates knowledge of the emergence, formation, and development of modern Azerbaijani statehood traditions.

CLO 2. Exhibits an understanding of Azerbaijani statehood during ancient and medieval times, as well as the role of the Azerbaijani people in establishing major empires in the East during the 15th–18th centuries.

CLO 3. Analyzes and evaluates the political, ideological, economic, and cultural factors contributing to the formation of modern Azerbaijani statehood.

CLO 4. Possesses knowledge of the loss of Azerbaijani statehood in the early 19th century and its political, economic, and social consequences; the struggle for national statehood; the establishment of the Azerbaijan Democratic Republic (First Republic); the Second Republic; Azerbaijani statehood under Soviet rule; the

national independence movement of the late 1980s; and the restoration of independent statehood.

CLO 5. Demonstrates the ability to systematically analyze the place and role of the Republic of Azerbaijan in the modern world.

CLO 6. Possesses knowledge of efforts to establish a secure international environment for the protection of national independence, the struggle to restore the territorial integrity of the country, and the process of Azerbaijan becoming a leading state in the South Caucasus.

" Learning Outcomes for the Course "Business and Academic Communication in the Azerbaijani Language" (CLO)

CLO 1. Demonstrates knowledge of the history of the Azerbaijani language, its development, and methods of its enrichment.

CLO 2. Understands the historical periods when the Azerbaijani language faced pressure and aggression from hostile forces, and recognizes the role of national unity, pride, and the contributions of prominent leaders and statesmen in preserving the language.

CLO 3. Analyzes scientific information in Azerbaijani related to the field of study and prepares both oral and written presentations.

CLO 4. Exhibits academic and professional communication skills in the Azerbaijani language.

CLO 5. Appreciates the uniqueness of the Azerbaijani language, uses translation as a tool to engage with the cultural heritage of other peoples, and establishes intercultural communication.

CLO 6. Commits to preserving the purity of the Azerbaijani language by resisting foreign influences and actively promoting its vitality.

Learning Outcomes for the Course "Business and Academic Communication in a Foreign Language" (CLO)
CLO 1. Analyzes scientific articles related to their field of study in a foreign language and prepares concise summaries.
CLO 2. Demonstrates the ability to analyze the grammatical, lexical, and semantic structures of the foreign language.
CLO 3. Represents and conveys their nation's cultural and moral values, as well as achievements, in international contexts.
CLO 4. Engages in exchange of ideas and experiences, establishing effective business communication in the foreign language.
CLO 5. Possesses foreign language proficiency and develops interpersonal communication skills, enabling effective teamwork.
CLO 6. Delivers both oral and written presentations of scientific information in the foreign language relevant to their field of specialization.

Course Learning Outcomes (CLO) for "Mathematics"
CLO 1. Applies mathematical knowledge to ecological research.
CLO 2. Explains fundamental concepts in ecological statistics.
CLO 3. Performs statistical processing of research results.
CLO 4. Utilizes statistical principles and theories in ecological studies.
CLO 5. Conducts mathematical calculations based on results obtained from ecological research.
CLO 6. Assesses the accuracy and validity of results derived from ecological research.

Physics Course Learning Outcomes (CLO)
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CLO 1. Explains the essence of physical processes and laws.

CLO 2. Describes phenomena occurring inside physical bodies or involving them from a physical perspective.

CLO 3. Explains the structure and properties of the material world surrounding us from a physical viewpoint.

CLO 4. Interprets phenomena based on knowledge of the properties of various types of radiation.

CLO 5. Explains the laws governing natural phenomena.

CLO 6. Applies physical methods essential for the investigation of environmental objects based on knowledge of their principles.

Chemistry Course Learning Outcomes (CLO)

CLO 1. Explains fundamental principles and concepts of general chemistry.

CLO 2. Determines the composition, structure, and properties of chemical substances.

CLO 3. Performs calculations for preparing solutions of various concentrations.

CLO 4. Identifies properties of inorganic and organic substances.

CLO 5. Explains the effects of various factors on chemical transformations.

CLO 6. Applies chemical methods essential for the investigation of environmental objects based on knowledge of their principles.

Biology Course Learning Outcomes (CLO)

CLO 1. Explains the role of biology within the system of sciences, education, and human life.

CLO 2. Explains fundamental principles and concepts of biology.

CLO 3. Describes the relationship between biology and other sciences, including cell structure and physicochemical processes in living organisms.

CLO 4. Explains the laws governing the transmission of genetic information.

CLO 5. Provides explanations about the structure, functions, and lifestyles of plants and animals.

CLO 6. Explains the complex structure and functions of the human organism, physiological processes, and the role of humans in nature and society.

General Ecology Course Learning Outcomes (CLO)

CLO 1. Develops theoretical knowledge of ecological terminology, core concepts, the structure of ecological knowledge, and approaches to solving ecological problems.

CLO 2. Forms a comprehensive ecological worldview based on the significance of organism-level organization, complexity of interactions between living and non-living nature, and the human role in ecological systems and the biosphere.

CLO 3. Explains key ecological factors, habitats, organisms' adaptations, and fundamental laws of organism-environment interactions.

CLO 4. Describes population structure and dynamics, types of survival strategies, survivorship curves, and methods for estimating population size and density.

CLO 5. Explains the taxonomic composition and functional structure of biocenoses, as well as types of biotic interactions within them.

CLO 6. Discusses the evolution and sustainability of the biosphere, mechanisms of self-regulation in living systems, and laws governing productivity.

Animal Ecology Course Learning Outcomes (CLO)

CLO 1. Understands animal ecology as a derivative science of general ecology, considering the animal kingdom as an open system on a planetary scale, emphasizing interdependence and interactions with the environment.

CLO 2. Recognizes communication and information transfer processes within living systems as integrative chains in populations, both intra- and interspecific.

CLO 3. Explains the direct relationships of animal ecology with physiology, morphology, ethology, zoogeography, and paleontology.

CLO 4. Describes various ecological groups of animals and their ecological niches across terrestrial and aquatic biomes.

CLO 5. Explains morphological, physiological, ethological, and other adaptations of organisms from prokaryotes to eukaryotes in response to different environmental conditions.

CLO 6. Analyzes the biodiversity of the animal kingdom and its significance for humans.

Biodiversity Conservation Course Learning Outcomes (CLO)

CLO 1. Develops a general worldview for understanding the diversity of life on Earth and fosters a high level of civic responsibility for life conservation.

CLO 2. Explains the functions, values, and levels of biological diversity.

CLO 3. Provides knowledge about monitoring and mapping biodiversity.

CLO 4. Explains causes of biodiversity loss and conservation strategies.

CLO 5. Provides information about continental biodiversity and the biodiversity of Azerbaijan.

CLO 6. Discusses contemporary approaches to biodiversity assessment and conservation.

Human Ecology and Sustainable Development Course Learning Outcomes (CLO)
CLO 1. Explains key ecological issues related to human-environment interactions, possibilities and prospects for sustainable development of nature and society, and main challenges in the transition to sustainability.
CLO 2. Describes natural and social environmental factors affecting human health and social welfare, as well as biological and social bases of human behavior.
CLO 3. Explains the impact of natural and anthropogenic factors on humans and classifies diseases depending on environmental influences.
CLO 4. Interprets the philosophical foundations of interactions within the "human-society" system, historical types of human-nature interactions, causes of ecological crises, and the complex nature of ecological problems.
CLO 5. Describes characteristic aspects of lifestyle and quality of life in urban and rural environments and factors shaping human habitats.
CLO 6. Provides information on ecological, economic, and legal policies promoting development of a society based on harmony between humans and nature.

Ecological Monitoring Course Learning Outcomes (CLO)
CLO 1. Explains the structure, organization, and operational principles of modern monitoring systems encompassing all environmental components and their interactions.
CLO 2. Provides information on biomonitoring and bioindication, including bioindication in various environments.
CLO 3. Describes features of biodiversity monitoring of plants and animals in nature.
CLO 4. Explains priorities in organizing chemical monitoring systems.
CLO 5. Describes methods of eco-analytical control, including contact and remote sensing observation techniques.

CLO 6. Explains monitoring of atmospheric, hydrospheric, and soil pollution, as well as radioecological monitoring.

Ecological Chemistry Course Learning Outcomes (CLO)

CLO 1. Explains the Earth's geosphere, ongoing processes, planetary metabolism, pollutants, their sources, and distribution in the biosphere.

CLO 2. Describes permissible concentration levels and threshold limits of pollutants.

CLO 3. Explains modern theoretical issues in chemistry, chemical processes in the atmosphere, hydrosphere, and lithosphere, and methods for chemical analysis.

CLO 4. Describes major groups of pollutants, their migration, transformation, and accumulation in ecosystems

CLO 5. Explains mechanisms of environmental factors affecting organisms and their tolerance thresholds, as well as adaptation to environmental stress.

CLO 6. Explains the impact of various pollutants on organisms, biocenoses, and human health.

Ecological Research Methods Course Learning Outcomes (CLO)

CLO 1. Explains classical and instrumental methods, devices used for chemical analysis, their significance, and applications.

CLO 2. Describes quantitative characteristics of separation and concentration methods, extraction techniques, and practical uses of extraction.

CLO 3. Explains emission sources of heavy metals, their forms in aquatic ecosystems, and factors influencing their toxicity.

CLO 4. Describes molecular adsorption spectrometry and photometric analysis methods.

CLO 5. Explains types, applications, and features of chromatographic analysis methods.

CLO 6. Explains mathematical evaluation of analytical results, accuracy, precision, selectivity, and types of systematic and random errors in analysis.

Air and Water Quality Pollution and Protection Course Learning Outcomes (CLO)

CLO 1. Explains the layers, structure, and composition of the atmosphere; the role of water in the biosphere; and classification of natural waters.

CLO 2. Describes chemical reactions occurring in the atmosphere, gas composition of natural waters, aerobic and anaerobic processes in natural waters, and microcomponents in precipitation.

CLO 3. Explains greenhouse gases causing the greenhouse effect and their atmospheric roles; physical-ecological indicators of water; chemical pollution of natural waters; and chemical-ecological monitoring of hydroecosystems.

CLO 4. Explains causes of acid rain formation, its effects, and sanitary-hygienic, epidemiological, and ecological assessment of drinking water.

CLO 5. Describes the role of atmospheric aerosols in the air and their toxic effects; quantity and pollution of drinking water; and drinking water issues in Azerbaijan.

CLO 6. Explains methods for air pollution elimination and wastewater treatment methods including mechanical, physico-chemical, chemical, and biological purification.

Biosphere and Its Protection Course Learning Outcomes (CLO)

CLO 1. Explains basic concepts of the biosphere, its structure, and biotic evolution.

CLO 2. Describes living, biogenic, and biocosmic substances, and interactions between living organisms and biosphere components.

CLO 3. Explains large-scale (geological) cycles and small-scale (biogeochemical) cycles and functions of living matter in the biosphere.

CLO 4. Explains biogeochemical cycling of chemical elements and role of inorganic substances in the biosphere.

CLO 5. Describes transformation of the biosphere into the noosphere and compares the biosphere and technosphere.

CLO 6. Explains main principles of creating waste-free production and its ecological importance.

Industrial Ecology Course Learning Outcomes (CLO)

CLO 1. Explains main global problems and fundamental laws of interactions between living organisms and nature.

CLO 2. Describes the impact of pollutants on the environment and their migration in the biosphere.

CLO 3. Explains main environmental quality standards.

CLO 4. Explains main methods of rational nature use and environmental protection.

CLO 5. Describes methods of industrial and household waste processing and their reuse.

CLO 6. Explains principles of organizing waste-free and resource-saving production.

Fundamentals of Earth Sciences Course Learning Outcomes (CLO)

CLO 1. Analyzes composition, structure, and general laws of development of Earth's geographical layers.

CLO 2. Explains the main content of sciences studying Earth as a planet, such as geography, geophysics, geology, etc.

CLO 3. Explains Earth's origin, composition, structure, movements, history of development, origin of mineral resources, and laws of their distribution.

CLO 4. Studies main relief forms on Earth's surface.

CLO 5. Clarifies the essence of a systematic approach of Earth sciences in complex environmental studies.

CLO 6. Determines features of using remote sensing images in environmental studies within Earth sciences.

Ecological Cartography and Geographic Information Systems Course Learning Outcomes (CLO)

CLO 1. Conducts study of descriptive methods for ecological mapping.

CLO 2. Explains main characteristics of geographic information systems (GIS).

CLO 3. Uses software and hardware support of GIS in ecological mapping.

CLO 4. Applies remote sensing imagery in ecological monitoring.

CLO 5. Performs calculations using GIS capabilities in comprehensive environmental studies.

CLO 6. Compiles ecological maps using GIS.

Sustainable Management of Natural Resources Course Learning Outcomes (CLO)

CLO 1. Explains interactions between society and nature.

CLO 2. Describes principles of efficient use and protection of natural resources.

CLO 3. Develops legal foundations for sustainable use of natural resources.

CLO 4. Implements organizational and legal support for sustainable management of natural resources.

CLO 5. Determines ecological and legal responsibility in sustainable natural resource management.

CLO 6. Applies ecological and legal regimes of natural resource use.

Forestry Course Learning Outcomes (CLO)

CLO 1. Explains content of forest ecosystems and natural environment restoration.

CLO 2. Studies role of forest ecosystems in forming ecological environment.

CLO 3. Determines study of heat and moisture regimes in forests.

CLO 4. Calculates developmental stages of forest ecosystems.

CLO 5. Characterizes forest fires and measures for their control.

CLO 6. Implements scientific principles of forest harvesting methods.

Landscape Science and Landscape Ecology Course Learning Outcomes (CLO)

CLO 1. Identifies local, regional, and global factors forming landscapes.

CLO 2. Determines types, dynamics, and evolutionary stages of landscapes.

CLO 3. Explains threshold of landscape degradation and landscape's role in the biosphere.

CLO 4. Calculates ecological capacity of landscapes.

CLO 5. Applies landscape resistance degree to anthropogenic impacts.

CLO 6. Uses remote sensing images and modern computer software in landscape studies.

Geographic Ecology Course Learning Outcomes (CLO)

CLO 1. Explains spatial and planetary characteristics of eco-geographical processes.

CLO 2. Explains regional and local features and interrelations of eco-geographical processes.

CLO 3. Describes ecosystem functions, dynamics, and their geochemical and geophysical properties.

CLO 4. Explains optimal levels of ecosystem usefulness to society.

CLO 5. Explains foundations of modern ecology and classical fundamental bioecology, including the role of living matter in the biosphere.

CLO 6. Explains ecology of ecosystems, their dynamics, and interactions.

Soil Science Course Learning Outcomes (CLO)

CLO 1. Explains genesis, structure, composition, and properties of soils.

CLO 4. Explains ways of efficient use of soil in agriculture and other economic sectors.

CLO 2. Explains patterns of geographical distribution of soils.

CLO 3. Describes the formation and development of soil fertility, highlighting its interaction with the environment.

CLO 4. Explains ways of efficient use of soil in agriculture and other economic sectors.

CLO 5. Explains variability of soil cover under agricultural use conditions.

CLO 6. Describes methods for increasing and restoring soil fertility.

Environmental Law Course Learning Outcomes (CLO)

CLO 1. Explains the Land Code of the Republic of Azerbaijan.

CLO 2. Explains the Forest Code of the Republic of Azerbaijan.

CLO 3. Describes the Water Code of the Republic of Azerbaijan.

CLO 4. Explains legal norms on environmental protection of the Republic of Azerbaijan.

CLO 5. Describes other normative-legal acts related to the enforcement of environmental legislation.

CLO 6. Explains legal and non-legal forms of environmental protection.

Civil Defense Course Learning Outcomes (CLO)

CLO 1. Understands basics, forces, and means of civil defense.

CLO 2. Understands emergencies and their characteristics.

CLO 3. Acquires knowledge about population protection and civil defense awareness during emergencies.

CLO 4. Can use individual and collective protection means.

CLO 5. Understands basics and assessment of industrial facility resilience during emergencies.

CLO 6. Has knowledge on organization and implementation of emergency consequences elimination.

Appendix 2

Matrix of Course and Educational Program Learning Outcomes

Block name	Course name	Program Learning Outcomes									
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
General Courses	Business and Academic Communication in Azerbaijani	X									
	History of Azerbaijan		X								
	Business and Academic Communication in a Foreign Language	X									
	Elective Courses		X					X			
	Chemistry				X						
	Biology								X		
	Fundamentals of Earth Sciences							X			
	Higher Mathematics				X						
	Biosphere and Its Protection					X	X				
	Physics				X						
	Geographical Ecology							X			

Major courses	General Ecology							X		
	Soil Science					X				
	Ecological Research Methods						X			
	Landscape Science and Landscape Ecology							X		
	Animal Ecology								X	
	Air and Water Quality, Pollution, and Protection						X			
	Ecological Cartography and Geographic Information Systems				X			X		
	Environmental Law								X	
	Industrial Ecology						X			

