MINISTRY OF SCIENCE AND EDUCATION OF THE REPUBLIC OF AZERBAIJAN

Approved by Order № _
of the Ministry of Science and Education of the Republic of Azerbaijan
dated _____ 2025

E D U C A T I O N A L P R O G R A M M E

FOR THE MASTER'S LEVEL OF HIGHER

EDUCATION

Specialty code and title: 7005004 - "Ecology"

BAKU – 2025

1. General Provisions

1.1. The educational programme for the Master's level in the specialty **7005004 – "Ecology"** (hereinafter referred to as the "Educational Programme") has been developed in accordance with the Law of the Republic of Azerbaijan "On Education," the relevant resolutions of the Cabinet of Ministers of the Republic of Azerbaijan, the "Classification of Specialties for the Master's Level of Higher Education," advanced international practices, and labor market requirements.

1.2. The objectives of the Educational Programme as follows

– to define the competencies of graduates in the specialty, the framework of the specialty, teaching and learning methods by subjects, assessment methods, learning outcomes, infrastructure and human resource requirements for training specialists, as well as opportunities for internships, employment, and continuation of education;

– to familiarize students and employers with the knowledge, skills, and learning outcomes acquired by graduates;

– to inform stakeholders involved in the evaluation of compliance of specialist training with this Educational Programme.

1.3. The Educational Programme is mandatory for all higher education institutions operating in the Republic of Azerbaijan that provide Master's level training in this specialty, regardless of subordination ownership type, or organizational-legal form.

1.4. Under a five-day working regime, the total weekly academic workload of students, including classroom and extracurricular activities, shall be 45 academic hours (except for specialized higher education institutions). Of these, 12–16 academic hours shall consist of classroom instruction. The weekly teaching load may be modified for specializations studied in depth for professional purposes.

1.5. Each higher education institution shall develop a separate educational programme for every specialization under the specialty for which personnel training is conducted at that institution. In addition to the sections included in the educational programme of the relevant specialty, each specialization programme shall also reflect teaching and learning methods, methods for assessing learning outcomes, organization and evaluation of internships, and other relevant components specific to that specialization.

2.Graduate Competencies

2.1. Upon completion of the Educational Programme, graduates shall acquire the following general competencies:

- the ability to independently solve unexpected and complex problems within the framework of professional activity;
- the ability to propose and plan relevant activities and methods, and analyze their current and prospective outcomes;

- the ability to investigate the causes of problems related to the field of activity or education and solve them within specific timeframes and under conditions of limited information;
- the ability to select and apply appropriate technologies and methods in solving problems related to the field of activity or education, as well as to determine, evaluate, and assess expected outcomes;
- the ability to critically evaluate one's own activities while solving problems related to the field of activity or education;
- the ability to present and substantiate problems related to the field of activity or education orally and in writing in Azerbaijani and one foreign language, and to participate in relevant discussions with specialists and non-specialists;
- the ability to transfer knowledge and competencies to others through various methods;
- the ability to act in accordance with ethical standards under all circumstances, understanding the ethical aspects, opportunities, limitations, and social role of personal behaviour;
- the ability to assess personal and others' needs related to lifelong learning and professional development, and to use effective methods necessary for independent learning.

2.2. Upon completion of the Educational Programme, graduates of specializations under specialty **7005004- "Ecology"** will acquire the following professional competencies:

Specialization: "Environmental Protection and Restoration Methods"

- identify anthropogenic impacts on various environmental components and plan and implement scientifically grounded protection and restoration measures;
- analyze global processes and their regional characteristics, as well as the consequences of modern global ecological-economic problems;
- monitor levels of soil, water, and air pollution, analyze collected data, assess environmental conditions, and prepare reports;
- apply restorative ecological methods in damaged territories and develop and implement biodiversity restoration projects;
- apply Geographic Information Systems (GIS) in the study of landscapes and biodiversity and conduct landscape regionalization based on cartographic materials;
- prepare environmental expertise documentation and assess the environmental impact of economic and construction projects;
- apply international environmental conventions and legal regulations at the national level and ensure compliance;
- investigate the impact of climate change on the environment, identify risks, and develop adaptation measures;
- propose relevant activities and methods and scientifically analyze their current and prospective outcomes;
- investigate the causes of environmental problems and solve them effectively under conditions of limited information.

Specialization: "Agroeceology"

- evaluate interactions among soil, plants, water, and climate factors in agroecosystems and analyze the relationship between soil and the environment;
- apply principles of sustainable agriculture by ensuring soil fertility preservation, efficient use of natural resources, and agroecological balance through optimal fertilization schemes based on soil chemical composition;
- identify risks arising from agricultural activities affecting the environment and evaluate agroecological risks and anthropogenic impacts by proposing environmentally sound approaches;
- determine environmentally based fertilization and plant nutrition strategies;
- understand the significance of biodiversity and apply knowledge regarding biodiversity conservation in agriculture and its impact on production;
- organize agroecological monitoring and conduct environmental indicator analysis through data interpretation and evidence-based conclusions;
- assess the effects of climate change on productivity, soil regimes, and ecosystems and develop appropriate adaptation measures for agriculture and agroecosystems.

Specialization: "Environmental Monitoring and Environmental Modelling"

- systematically monitor changes occurring in different environmental components and analyze collected data using statistical and mathematical modelling methods;
- model environmental conditions and develop forecasts using GIS and other software tools to support management decision-making;
- identify pollution sources and assess risks by analyzing environmental impact

dynamics through computer models;
- investigate causes of ecological processes and human-induced problems and apply effective methods under limited and uncertain information conditions;
- prepare environmental reports, assessments, and expertise documentation based on monitoring results;
- forecast future ecosystem conditions through modelling climate change and anthropogenic impacts and develop adaptation and risk management strategies;
- contribute to the establishment and improvement of national environmental monitoring systems in accordance with international standards and conventions;
- conduct scientific research collaboratively and effectively present environmental information orally and in writing in Azerbaijani and foreign languages.

Specialization: "Bioecology"

- each foundational ecology subjects at the undergraduate level of higher education;
- explain causes of environmental problems and their socio-economic and cultural consequences and propose methods for mitigating negative outcomes;
- independently explain the role and ecology of different vertebrate classes within ecosystems;
- independently assess ecosystem conditions based on ecosystem components;
- independently plan research activities;
- collect information related to specific problems, select appropriate methodologies, process data, and critically present findings;
- prepare scientific publications (theses, articles, reports).

Specialization: "Biodiversity Conservation"

- teach core specialty subjects at the undergraduate level of higher education;
- explain causes and socio-economic-cultural consequences of environmental problems and propose methods for mitigating negative outcomes;
- independently identify widespread representatives of biodiversity in the Caucasus and Azerbaijan, understand ecosystem economics, ecosystem services, modern land management concepts, Sustainable Development Goals, and relevant international measures and legal frameworks, and apply them in research;
- develop and apply ecological principles in agriculture, forestry, environmental technologies, and other sectors;
- independently plan research activities in environmental protection, biodiversity, sustainability, and related fields;
- collect data related to specific problems, select appropriate methodologies, process information, and critically present results;
- prepare scientific publications (theses, articles, reports).

Specialization: "Environmental Chemistry"

- regulate chemical, physical, and biological pollutants in natural environmental components;
- model chemical processes occurring in natural environments;
- analyze the effects of substances emitted into the environment by industrial enterprises on living organisms;
- monitor environmental conditions using modern chemical, physical, and physico-chemical research methods;

- apply modern environmentally safe technologies for the purification of chemical pollutants;
- apply alternative energy sources and achievements of green chemistry for environmental improvement;
- plan environmental research projects, collect data, draw conclusions, prepare scientific reports, and develop environmental projects.

Specialization: “Environmental Expertise”

- conduct environmental expertise by analyzing compliance of project documentation and economic activities with environmental requirements and preparing substantiated expert conclusions;
- apply Environmental Impact Assessment (EIA) and environmental standards for calculating ecological risks and reducing negative impacts;
- use modern environmental monitoring technologies and instrumental and laboratory control methods;
- conduct scientific research in ecology and environmental protection, including planning experiments, analyzing and interpreting results, and assessing pollution levels in ecosystems and biodiversity;
- prepare environmental expertise documentation and assess environmental impacts of economic and construction projects;
- forecast environmental outcomes based on modelling of natural and technogenic processes and sustainable development scenarios;
- supervise environmental safety and natural resource use and evaluate the effectiveness of environmental protection measures in enterprises;
- understand the fundamentals of Azerbaijani and international environmental law and participate in environmental auditing and certification processes;
- use ICT tools and relevant software for environmental data visualization, modelling, and reporting;
- prepare expert opinions and reports and participate in public hearings and multidisciplinary projects.

Specialization: “Environmental Management”

- apply environmental management principles to solve problems related to the greening of the economy;
- conduct state, public, and industrial environmental control;
- perform environmental monitoring using modern methods, including GIS technologies;
- develop mathematical modelling programmes for forecasting environmental conditions and problems;
- implement all activities related to waste management, including GIS applications;
- evaluate environmental efficiency of enterprises using ISO 14000 standards;
- conduct environmental audits by meeting qualification requirements for environmental auditors;
- carry out environmental certification based on standards and quality certification systems;
- apply payment systems related to the use, reproduction, and protection of natural resources.

3 Structure of the Educational Programme

3.1 . The normative duration of study and the degree awarded are as follows:

Specialization	Degree Awarded	Duration (Full-time)	Credits
Environmental Protection and Restoration Methods	Master's Degree	2 years	120
Agroecology			
Environmental Monitoring and Environmental Modelling			
Bioecology			
Biodiversity Conservation			
Environmental Chemistry			
Environmental Expertise			
Environmental Management			

3.2 The educational program must consist of 120 ECTS credits (2 years). Each semester is designed to include 30 credits, with no more than 5 courses per semester. The credits are distributed as follows:

№	Course Title	ECTS credits
1	**Research Methods** This course focuses on the interdependence of quantitative and qualitative research methods, measurement, research design, and analysis. Within the framework of the course, it aims to develop research competencies, the use of library and internet resources as sources of information, data investigation and analysis, and the presentation of findings in a systematic and effective manner.	6
2	**Academic Writing and Ethics** The purpose of this course is to teach the fundamentals of academic writing, speaking, and integrity, and to develop master's students' skills in professionally writing scientific articles, dissertations, essays, and other academic documents, as well as delivering professional presentations at conferences, symposiums, seminars, and scientific discussions, while adhering to publication ethics. The course will provide students with knowledge and competencies related to academic style, the proper use of sources, citation rules, and ethical standards.	6

3	**Research Analytics** The teaching of this course covers the data analysis process, types of data, sources of data collection, the development of data analysis strategies, data preparation and cleaning for analysis, data organization and systematization, and data visualization. The course also introduces software commonly used in analytical studies relevant to the field, such as “Excel,” “SPSS,” “Stata,” “R,” “MAXQDA,” “MATLAB,” and “Python.” In addition, it includes the application of analytical methods used in research within the specialization area, including statistical tests and analyses, quantitative and qualitative analyses, experimental analyses, questionnaire and survey analyses, and the preparation of relevant interpretations and reports based on analytical findings.	6
4	**Compulsory Courses Determined by the Higher Education Institution** The compulsory courses included in this section, depending on the specialization, are individually determined by each higher education institution and are reflected in the educational program of the respective specialization.	72
...	**Elective Courses Determined by the Higher Education Institution** The relevant elective courses are individually determined by each higher education institution depending on the specialization and are reflected in the educational program of the respective specialization.	
Internship		
...	**Scientific-Pedagogical Internship**	6
...	**Scientific Research Internship**	6
Dissertation thesis		
...	**Master’s Thesis**	18
TOTAL:		**120**

[1] Here, the term “courses” includes, in addition to courses, projects (including a “Capstone” project), creative work, laboratory work, and other relevant educational activities (where applicable). These courses are determined by the higher education institution, taking into account the expertise of the

academic staff, research infrastructure, and local and international employment opportunities, and are compulsory for students admitted to the relevant specialization. This section must include a minimum of four courses.

2. Here, the term “courses” includes, in addition to courses, projects (including a “Capstone” project), creative work, laboratory work, and other relevant educational activities (where applicable). These courses are offered by the higher education institution, taking into consideration the expertise of the academic staff, research infrastructure, and local and international employment opportunities. When determining these courses, labor market demands should also be taken into account, and for this purpose, it is recommended to establish a working group consisting of representatives of higher education institutions and the labor market. The courses determined by the higher education institution should be elective in nature for students and should also facilitate students’ participation in international exchange programs.

This section must include a minimum of three courses

4. Learning Outcomes of the Program and Each Course

4.1. Graduates of this educational program must possess a systematic and broad understanding of the fundamental concepts, theoretical principles, and research methods related to the field of study or professional activity, and must acquire in-depth knowledge in a specific (specialized) field of study or professional practice.

4.2. The determination of learning outcomes for each course within the specialization program and the preparation of the syllabus for each course fall within the authority of the higher education institution and/or the academic staff.

4.3. The program learning outcomes for the specialization are defined in Appendix 1. The learning outcomes for individual courses are determined by each higher education institution. The learning outcomes matrix (Appendix 2) must reflect the relationship between the courses and the learning outcomes of the educational program.

4.4**.** In order to ensure that the educational program provides scientific and practical content responsive to the changing needs of society and the labor market, course syllabi must be updated regularly.

5. Infrastructure and Human Resource Capacity

5.1. The teaching, learning, and assessment process of the educational program requires the higher education institution to possess the following infrastructure.

- Computer laboratories;

- Ecological modeling and simulation software for the statistical and environmental assessment of experiments (such as SPSS, R, QGIS/ArcGIS, SimaPro/OpenLCA, SWAT, HEC-RAS, COMSOL, BioWin, ENVI, EcoRisk View, MATLAB, Enablon, SAP EHS, Ecomanager, etc.);

- A scientific library (including modern textbooks and monographs in ecology) and access to digital resources and international databases such as Scopus, Web of Science, Springer, ISO and EMAS standards, ecoinvent, ScienceDirect, and the databases of the World Health Organization;

- Lecture and seminar rooms equipped with appropriate facilities;

- Educational and scientific research laboratories;

- Access to the infrastructure of industrial enterprises, laboratories, and scientific centers operating in the fields of ecology, chemistry, and biology;

- Access to international cooperation and mobility programs.

5.2. As a rule, the academic staff involved in teaching at higher education institutions hold academic degrees. Specialists who do not possess an academic degree but have at least five years of professional experience in the relevant field may also be involved in teaching.

5.3. Scientific supervision of master's dissertations is generally carried out by individuals holding an academic title or academic degree.

6. Career Opportunities and Lifelong Learning

6.1. Graduates of the 7005004 – "Ecology" program will be able to work in the following fields and professions:

"Environmental Protection and Restoration Methods" Specialization

- Research scientist at scientific research institutes
- Managerial and specialist positions in higher education, secondary specialized education, and vocational education institutions
- Managerial and specialist positions in state and municipal administrative bodies
- Environmental specialist in chemical and petrochemical industrial enterprises
- Specialist in the ecology and energy sectors
- Specialist positions in the public and private sectors
- Project manager, expert, and consultant on international environmental standards and projects in international environmental organizations such as United Nations Environment Programme, World Wide Fund for Nature, International Union for Conservation of Nature, Food and Agriculture Organization, and Greenpeace
- Environmental expert, project developer, and consulting specialist in environmental consulting and engineering companies

"Agroecology" Specialization

- Research scientist at scientific research institutes
- Managerial and specialist positions in higher education, secondary specialized education, and vocational education institutions
- Managerial and specialist positions in state and municipal administrative bodies
- Consultant specialist in the private sector, including agricultural companies, agroservice, and consulting firms
- Project manager, expert, and consultant on international environmental standards and projects in organizations such as United Nations Environment Programme, World Wide Fund for Nature, International Union for Conservation of Nature, Food and Agriculture Organization, and Greenpeace
- Environmental expert, project developer, and consulting specialist in environmental consulting and engineering companies
- Specialist and executive management positions in local and international projects

“Environmental Monitoring and Environmental Modeling” Specialization

- Research scientist at scientific research institutes
- Managerial and specialist positions in higher education, secondary specialized education, and vocational education institutions
- Managerial and specialist positions in state and municipal administrative bodies
- Environmental specialist in chemical and petrochemical industrial enterprises
- Specialist in the ecology and energy sectors
- Specialist positions in the public and private sectors
- Project manager, expert, and consultant on international environmental standards and projects in organizations such as United Nations Environment Programme, World Wide Fund for Nature, International Union for Conservation of Nature, Food and Agriculture Organization, and Greenpeace
- Environmental expert, project developer, and consulting specialist in environmental consulting and engineering companies

“Bioecology” Specialization

- Research scientist at scientific research institutes
- Managerial and specialist positions in higher education, secondary specialized education, and vocational education institutions
- Managerial and specialist positions in state and municipal administrative bodies
- Managerial and specialist positions in industrial enterprises
- Inspector, research scientist, and ecotourism expert in State Nature Reserves, National Parks, and other specially protected natural areas
- Specialist positions in the public and private sectors
- Project manager, expert, and consultant on international environmental standards and projects in organizations such as United Nations Environment Programme, World Wide Fund for Nature, International Union for Conservation of Nature, Food and Agriculture Organization, and Greenpeace
- Environmental expert, project developer, and consulting specialist in environmental consulting and engineering companies
- Specialist and executive management positions in local and international projects

“Biodiversity Conservation” Specialization

- Research scientist at scientific research institutes
- Managerial and specialist positions in higher education, secondary specialized education, and vocational education institutions
- Managerial and specialist positions in state and municipal administrative bodies
- Managerial and specialist positions in industrial enterprises
- Inspector, research scientist, and ecotourism expert in State Nature Reserves, National Parks, and other specially protected natural areas
- Specialist positions in the public and private sectors
- Project manager, expert, and consultant on international environmental standards and projects in organizations such as UNESCO, United States Agency for International Development, United Nations Environment Programme, World Wide Fund for Nature, International Union for Conservation of Nature, Food and Agriculture Organization, and Greenpeace
- Environmental expert, project developer, and consulting specialist in environmental consulting and engineering companies
- Specialist and executive management positions in local and international projects

“Environmental Chemistry” Specialization

- Research scientist at scientific research institutes
- Managerial and specialist positions in higher education, secondary specialized education, and vocational education institutions
- Managerial and specialist positions in state and municipal administrative bodies
- Managerial and specialist positions in industrial enterprises
- Environmental specialist in chemical and petrochemical industry enterprises
- Specialist in analytical laboratories for the analysis of the chemical composition of food products, pharmaceuticals, cosmetics, and other goods
- Specialist positions in the public and private sectors
- Project manager, expert, and consultant on international environmental standards and projects in international environmental organizations
- Environmental expert, project developer, and consulting specialist in environmental consulting and engineering companies
- Specialist and executive management positions in local and international projects

Environmental Expertise” Specialization

- Research scientist at scientific research institutes
- Managerial and specialist positions in higher education, secondary specialized education, and vocational education institutions
- Managerial and specialist positions in state and municipal administrative bodies
- Managerial and specialist positions in industrial enterprises
- Specialist positions in the public and private sectors
- Project manager, expert, and consultant on international environmental standards and projects in international environmental organizations
- Environmental expert, project developer, and consulting specialist in environmental consulting and engineering companies

“Environmental Management” Specialization

- Research scientist at scientific research institutes
- Managerial and specialist positions in higher education, secondary specialized education, and vocational education institutions
- Managerial and specialist positions in state and municipal administrative bodies
- Managerial and specialist positions in industrial enterprises
- Specialist positions in the public and private sectors
- Specialist in the business and corporate sectors
- Project manager, expert, and consultant on international environmental standards and projects in organizations such as UNESCO, United States Agency for International Development, United Nations Environment Programme, World Wide Fund for Nature, International Union for Conservation of Nature, Food and Agriculture Organization, and Greenpeace
- Environmental expert, project developer, and consulting specialist in environmental consulting and engineering companies

6.2. Higher education institutions should regularly conduct surveys regarding the employment of graduates of the educational program and publish information about vacant positions on their official web pages.

6.3**.** Individuals who have completed the master's level of higher education (having defended their master's dissertation), or persons whose education is considered equivalent thereto (specialist physicians in medical education), may be admitted to doctoral studies leading to the degree of Doctor of Philosophy (PhD).

The knowledge, skills, and approaches acquired during the period of study constitute one of the essential prerequisites for graduates to engage in lifelong independent learning.

Appendix 1

Learning Outcomes of the Educational Program and Teaching Activities

For the Specialization "Environmental Protection and Restoration Methods"
PLO 1. Demonstrates the ability to analyze global environmental problems, their classification, geopolitical issues, problems arising from society–nature interactions, environmental pollution, ecological problems related to soil, water, and atmospheric air, the protection of the gene pool, and the regional environmental consequences of global processes affecting the country.
PLO 2. Based on advanced scientific knowledge of ecosystem structure, functional relationships, and principles of energy and matter circulation, demonstrates the ability to apply integrated approaches in biodiversity conservation, ecosystem service assessment, and sustainable environmental management.
PLO 3. By mastering scientific research methods (hypothesis formulation, data collection and analysis, and drawing conclusions), is able to conduct independent research on environmental issues and present the results to the public in an academic style; adheres to principles of environmental ethics and social responsibility; masters modern methods of environmental risk and environmental impact assessment and is capable of analyzing pollution levels through environmental monitoring and modeling and developing preventive measures.
PLO 4. Analyzes the environmental legal and regulatory documents of the Republic of Azerbaijan and international organizations; participates in the development and implementation of environmental management and policy strategies; demonstrates analytical skills in developing and implementing strategies for the efficient use and restoration of natural resources and applies reclamation, melioration, and ecological rehabilitation methods for ecosystem restoration.
PLO 5. Demonstrates the ability to analyze methods for the study, protection, and restoration of natural landscapes and biodiversity under anthropogenic impact; apply Geographic Information Systems (GIS) in biodiversity research; conduct observations on landscape components during field studies; work with cartographic and aerial photographic databases; and carry out landscape regionalization.
PLO 6. Systematizes and analyzes environmental data and makes scientifically grounded decisions using Geographic Information Systems (GIS), statistical and modeling software (such as SPSS, R, and Python); understands the main components and functional characteristics of GIS and the practical significance of digital information in managing ecological and socio-economic processes; and is able to classify natural resources through GIS, conduct digital mapping of ecological processes, and independently use relevant software for processing and identifying data within the GIS environment.

For the Specialization "Agroecology" - Program Learning Outcomes (PLO)
PLO 1. Acquires theoretical and practical knowledge of the organizational principles, productivity, structure, functions, and components (soil, plants, animals, microorganisms, and climate) of agroecosystems and demonstrates the ability to assess their ecological condition.
PLO 2. Demonstrates the ability to establish smart agriculture and sustainable production systems based on both modern and traditional agricultural knowledge through the application of innovative technologies and Geographic Information Systems (GIS); masters the principles of sustainable agriculture and applies methods aimed at maintaining ecological balance in agriculture while working with modern technologies.
PLO 3. Demonstrates the ability to apply ecologically based approaches to soil and water resource management, preservation of soil fertility, prevention of erosion, ecological assessment and sustainable use of soil resources, and efficient water use; and determines the directions of interaction between the agro-industrial complex and the environment and its individual components.
PLO-4 Understands the importance of biodiversity and demonstrates the ability to explain the significance of biodiversity conservation in agriculture and its impact on production.
PLO 5. Demonstrates the ability to analyze the environmental impacts of agricultural activities and assess ecological risks; explain the ecological transformation of agricultural activities, the importance of environmentally safe agricultural production, agroecological zoning, the maximum use of the natural bioenergy potential of agroecosystems, preservation and restoration of the natural resource base of the agricultural sector, and ways to reduce or minimize negative impacts on the natural environment.
PLO 6. Possesses multidisciplinary and teamwork skills, understands the relationship of agroecology with ecology, economics, social sciences, and agriculture, and is able to participate in interdisciplinary collaboration; demonstrates the ability to conduct research, collect and analyze data, and make decisions in the fields of agriculture and environmental protection.

For the Specialization "Environmental Monitoring and Environmental Modeling" **Program Learning Outcomes (PLO)**
PLO 1. Understands modern concepts of monitoring the physical, chemical, and biological components of the environment and demonstrates the ability to apply relevant methods and technologies for data collection and processing by fundamentally understanding ecological processes and interactions.
PLO 2. Demonstrates the ability to assess environmental conditions, model changes, and forecast various ecological scenarios; applies strategies for environmental risk analysis and management.

PLO 3. Demonstrates the ability to process, analyze, and visualize large-scale environmental data using Geographic Information Systems (GIS), remote sensing, statistical software, and dynamic modeling programs.
PLO 4. Applies scientific methodologies in environmental research, including scientific-pedagogical and scientific research practices, prepares independent scientific projects, and presents scientifically substantiated results in the form of scientific reports.
PLO 5. Participates in the development of environmental policies and sustainable management strategies, as well as socio-economic decision-making, using environmental monitoring and modeling data.
PLO 5. Participates in the development of environmental policies and sustainable management strategies, as well as socio-economic decision-making, using environmental monitoring and modeling data.

For the Specialization "Bioecology" **Program Learning Outcomes (PLO)**
PLO 1. Possesses knowledge of the historical roots and stages of development of ecology, the development of ecological science in Azerbaijan, and the basic principles and laws of ecology; acquires theoretical knowledge of modern trends and methods and applies them in research activities.
PLO 2. Understands the theoretical foundations of the dialectics of human–nature relations, the effects of natural and anthropogenic factors on ecological systems, methods for eliminating negative impacts, the limitations of biosphere resources and ways of their efficient use, the role of international cooperation at the global level, ethical principles and rules regarding nature, and environmental responsibility ethics, and applies them in research and daily life; demonstrates the ability to construct and use anthropoecological forecasting models, determine relationships between ecological conditions and environmental risk factors, apply system analysis methods in the study of human-environment interactions, and analyze and interpret scientific data on the biological and socio-demographic aspects of human ecology.
PLO 3. Demonstrates the ability to explain the role of fish, amphibians, reptiles, birds, and mammals in ecosystems and biocenoses; determine their ecological groups based on anatomical, morphological, ecological, and ethological indicators; identify zoogeographical distribution; and recognize common and rare species.
PLO 4. Demonstrates the ability to explain the ecological environment of the Caspian Sea, the taxonomic composition and ecology of its biological resources, the impact of natural and anthropogenic factors on rare species, and methods for their protection.

PLO 5. Demonstrates the ability to use the main types of bioindicators and test systems for assessing environmental conditions, apply methods for detecting and quantifying major environmental pollutants, conduct scientific experiments under field, laboratory, and industrial conditions, and independently determine and analyze the ecological state of the environment.
PLO 6. Demonstrates the ability to apply methods for studying animal behavior in natural and laboratory conditions, establish and analyze relationships between behavior patterns and environmental conditions, distinguish communication types among various taxonomic groups of animals, and compare them with human behavior.
For the Specialization "Biodiversity Conservation" **Program Learning Outcomes (PLO)**
PLO 1. Possesses knowledge of the historical roots and development stages of ecology, the development of ecological science in Azerbaijan, and the fundamental principles and laws of ecology; acquires theoretical knowledge of modern directions and methods and applies them in research activities; understands the theoretical foundations of human–nature relations, the effects of natural and anthropogenic factors on ecological systems, methods of mitigating negative impacts, the limitations of biosphere resources and efficient use methods, the role of international cooperation at the global level, ethical principles toward nature, and environmental responsibility ethics, and applies them in research and practical life.
PLO 2. Demonstrates the ability to characterize the major ecosystems of the Caucasus from west to east according to climate gradients extending from lowlands to the nival zone; independently identify widespread animal species and vascular plants in the ecosystems of the Caucasus and Azerbaijan using field guidebooks; determine ecological groups according to different factors; recognizes responsibility for the protection of species included in the Red Books of the Republic of Azerbaijan and the IUCN Red List; demonstrates the ability to describe abiotic landscape components, monitor, inventory, and assess vegetation cover and various animal species, identify animals by tracks, and analyze their habitats.
PLO 3. Demonstrates the ability to explain the definitions, processes, and driving forces of Global Change; resource limitations and demographic growth; land-use changes and consequences; natural hazards and disasters; the effects of climate change on Azerbaijan's ecosystems; food security and GMOs; major ethical issues of intra- and intergenerational justice; concepts of "strong" and "weak" sustainability; and governance principles; masters the goals of the Sustainable Development Concept, international initiatives and legislation in this field, and explains the opportunities and prospects for implementation at global and national levels, as well as Azerbaijan's achievements and challenges in sustainable development.

PLO 4. Understands the components, operating principles, role, and application areas of Geographic Information Systems (GIS) and demonstrates the ability to acquire and process data through remote sensing and apply them in biodiversity conservation and nature protection.
PLO 5. Demonstrates the ability to conduct ecological diagnostics and research, develop programs based on Environmental Impact Assessment (EIA) concepts and methodologies, and apply management principles and scientific models of Protected Natural Areas (PNAs) at local, regional, and global levels, taking into account international practices in environmental planning and environmental quality management.
PLO 6. Masters the prospects of ecosystem economics and economic thinking, tools, procedures, models used to calculate ecosystem benefits, various ecosystem services, empirical values of natural resources, and the theoretical and practical aspects of ecosystem assessment methods, and demonstrates a critical approach to ethics and ecosystem assessment.

For the Specialization "Environmental Chemistry" **Program Learning Outcomes (PLO)**
PLO 1. Demonstrates the ability to apply in practice issues related to the regulation of major pollutants, including heavy metals, pesticides, radionuclides, gaseous substances, and environmental pollution (chemical, physical, and biological).
PLO 2. Acquires theoretical knowledge of the evolution of the biosphere, the main biogeochemical cycles of chemical elements, and the pathways, migration, and transformation of pollutants in the atmosphere, water resources, soil, and food products, and demonstrates the ability to model chemical processes in the natural environment.
PLO 3. Demonstrates the ability to analyze and draw conclusions regarding organic compounds released into the environment from industrial enterprises, the transformation of pesticides and mineral fertilizers in nature, organic substances released as a result of oil refining and household-economic activities, and the harmful effects of chemical pollutants on living organisms.
PLO 4. Masters modern chemical, physical, and physicochemical research methods for environmental monitoring, as well as methods for removing pollutants from air, water, soil, and other objects, and demonstrates the ability to analyze and apply them in practice.

PLO 5. Acquires theoretical and practical knowledge of local, regional, and global pollution; global environmental problems; modern technologies for environmentally safe treatment of chemical pollutants; alternative energy sources; and the role of green chemistry in protecting environmental quality, and demonstrates the ability to manage environmental protection.
PLO 6. Possesses scientific research and project preparation skills and demonstrates the ability to plan environmental research, collect data, draw conclusions, prepare scientific reports, and demonstrate teamwork and management skills in the implementation of environmental projects.

For the Specialization "Environmental Expertise" **Program Learning Outcomes (PLO)**
PLO 1. Acquires fundamental knowledge of ecosystem structure and functionality, natural resource management, and maintenance of ecological balance, and performs relevant activities in environmental protection.
PLO 2. Acquires skills in analyzing and organizing environmental expertise processes, determines the environmental impact of various industrial, agricultural, and other economic activities, prepares expert evaluations, and participates in issuing opinions or permits for the export, re-export, import, re-import, and transit transportation of goods subject to export control and falling under the authority of the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan.
PLO 3. Participates in granting permits for the circulation of restricted civil objects; demonstrates the ability to apply national and international environmental legislation and analyze and implement environmental legal norms adopted by the Republic of Azerbaijan and international organizations.
PLO 4. Acquires methodological and technological knowledge related to the preparation of Environmental Impact Assessment (EIA) documents, environmental monitoring, and assessment; participates in making decisions that minimize environmental harm and demonstrates the ability to conduct EIA and environmental monitoring.
PLO 5. Demonstrates professional conduct based on the principles of objectivity, accuracy, and public responsibility in environmental expertise from the perspective of professional ethics and environmental responsibility.
PLO 6. Possesses scientific research and project preparation skills and demonstrates the ability to plan environmental research, collect data, draw conclusions, prepare scientific reports, and demonstrate teamwork and management skills in the implementation of environmental projects.

For the Specialization "Environmental Management" **Program Learning Outcomes (PLO)**
PLO 1. Acquires theoretical and practical knowledge regarding the greening of the economy and industrial activities, transition to sustainable development and a "green" economy, and efficient use of natural resources, including alternative energy sources; applies environmental management strategies in relevant fields and demonstrates the ability to make effective decisions.
PLO 2. Masters the professional requirements for environmental managers and methods for organizing and implementing environmental management systems; demonstrates the ability to apply environmental legal norms in practice and prepare and make management decisions in environmentally risky situations related to overcoming environmental crises within enterprises.
PLO 3. Masters the main marketing approaches in ecology and the system of standards applied to environmental products and demonstrates the ability to carry out environmental certification, labeling, and паспoptization, as well as management, marketing, commercial, and advertising activities related to the organization's environmental performance.
PLO 4. Masters modern eco-audit technologies and the procedures for conducting environmental audits in enterprises; acquires qualifications required for environmental auditors and demonstrates the ability to conduct environmental audits.
PLO 5. Masters the fundamentals of environmental insurance and demonstrates the ability to calculate economic damages, payments for the use of natural resources and environmental pollution, and conduct environmental insurance activities.
PLO 6. Demonstrates the ability to establish environmental management systems aimed at achieving clean, low-waste, and waste-free production goals at different levels of economic activity; apply Geographic Information Systems (GIS) in waste management; assess environmental policy and environmental efficiency of enterprises; and apply the ISO 14000 standards system in practice.

Appendix 2

Matrix of Learning Outcomes of the Educational Program and Teaching Activities

Higher education institutions should use the following table to determine how teaching activities (courses) support the achievement of the learning outcomes of the specialization educational program.

Teaching Activity (Course Name)						
	PLO1	PLO 2	PLO3	PLO 4	PLO 5	PLO6
Research Methods						
Academic Writing and Ethics						
Research Analytics						
Compulsory Courses Determined by the Higher Education Institution						
Elective Courses Determined by the Higher Education Institution						
Scientific- Pedagogical Internship						
Scientific Research Internship						
Master's Dissertation						

Agreed by:

Deputy Minister of Science and Education

_____Idris Isayev

Head of the Department of Science, Higher and Vocational Education

_____Assoc. Prof. Turkhan Suleymanov

_____ Academic Rasim Aliguliyev

Co-Chairs of the Working Group on Natural Sciences Specializations

_____ **Elchin Babayev**