

MINISTRY OF SCIENCE AND EDUCATION OF THE REPUBLIC OF AZERBAIJAN

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

EDUCATIONAL PROGRAM

FOR THE MASTER'S DEGREE LEVEL IN THE SPECIALIZATION

**Code and title of the specialization: 7005013 - “Water Bioresources and
aquaculture”**

BAKU - 2025

1. General Provisions

- 1.1.** The educational program for the Master’s degree level in the specialization 7005013 – “Water Bioresources and Aquaculture” (hereinafter referred to as the “Educational Program”) has been developed in accordance with the Law of the Republic of Azerbaijan “On Education”, relevant resolutions of the Cabinet of Ministers of the Republic of Azerbaijan, as well as the “Classification of Specializations at the Master’s Level of Higher Education”, advanced international practices, and the requirements of the labor market.
- 1.2.** The objectives of the Educational Program are as follows:
- to define the graduate competencies within the specialization, the scope of the specialization, teaching and learning methods for courses, assessment methods, learning outcomes, infrastructure and human resource requirements for personnel training, as well as opportunities for internships, employment, and continuation of studies for learners;
 - to familiarize students and employers with the knowledge, skills, and learning outcomes acquired by graduates;
 - to inform stakeholders involved in the evaluation process regarding the compliance of personnel training under this Educational Program with the established program requirements.
- 1.3.** The Educational Program is mandatory for all higher education institutions operating in the Republic of Azerbaijan and providing master’s degree training in this specialization, regardless of their subordination, ownership type, or organizational-legal form.
- 1.4.** Under a five-day working schedule, the total weekly academic workload of the student, including both classroom and extracurricular activities, shall amount to 45 academic hours. Of these, 12–16 academic hours shall consist of classroom instruction. For specializations involving in-depth professional training, the weekly course workload may be adjusted.
- 1.5.** Each higher education institution shall develop a separate educational program for every specialization under which personnel training is conducted within the institution. In addition to the sections included in the educational program of the relevant specialization, each specialization-specific educational program shall also reflect teaching and learning methods, methods for the assessment of 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 Program, the graduate shall acquire the following general competencies:
- independently handle unexpected and complex issues within the scope of professional activity;
 - propose and plan relevant activities and methods, and analyze their current and prospective outcomes;
 - investigate the causes of problems related to the field of activity or study and resolve them

- within a specific timeframe and under conditions of limited information;
- select and apply appropriate technologies and methods in solving problems related to the field of activity or study, as well as identify, evaluate, and assess expected outcomes;
- critically evaluate their own performance in solving problems related to the field of activity or study;
- present and justify problems related to the field of activity or study both orally and in writing in Azerbaijani and in one foreign language, and participate in relevant discussions with specialists and non-specialists;
- transfer their knowledge and competencies to others through various methods;
- act in accordance with ethical standards in all circumstances, and understand the ethical aspects, opportunities, limitations, and social role of personal conduct; assess their own and others' needs related to lifelong learning and professional development, and apply effective methods necessary for independent learning;
- systematically analyze the structure, function, biodiversity, and ecological dynamics of aquatic ecosystems and their bioresources;
- scientifically evaluate the impact of global changes (climate change, anthropogenic pressures) on the condition of aquatic ecosystems;
- possess advanced and specialized knowledge of biology, ecology, population dynamics, genetics, and conservation status of aquatic bioresources (fish, invertebrates, aquatic plants), and apply acquired knowledge to solving practical problems in this field;
- independently apply and improve modern models and advanced methodologies for the assessment, monitoring, and forecasting of aquatic bioresource stocks;
- possess in-depth knowledge of the biotechnological foundations of various forms of aquaculture, as well as the principles of environmental safety and economic efficiency;
- develop innovative aquaculture projects;
- critically analyze national and international policies, legislation, and management mechanisms related to the conservation, restoration, and sustainable use of aquatic bioresources;
- develop management strategies and recommendations based on the ecosystem approach and the precautionary principle;
- independently plan and conduct scientific research in the field of aquatic bioresources, analyze the results, and present them at a high scientific level;
- establish effective communication with stakeholders in the management of aquatic bioresources, conduct consultations, and facilitate consensus-based decision-making processes.

2.2. Upon completion of the educational program, graduates of the **7005013 “Water Bioresources and Aquaculture”** specialty, **within their respective specializations**, must acquire the following **professional competencies: Within the “Aqua bioresources” specialization**

- the ability to systematically analyze the structure, function, biodiversity, and ecological dynamics of aquatic ecosystems and their bioresources, and to scientifically evaluate the impact of global changes (climate change, anthropogenic pressures, etc.) on the condition of aquatic ecosystems;

- the ability to demonstrate advanced and specialized knowledge in biology, ecology, population dynamics, genetics, and conservation status of aquatic bioresources (fish, invertebrates, aquatic plants, etc.), and to apply acquired knowledge to solving practical problems in the field;
- the ability to independently apply and improve modern theories, models, and advanced methodologies for the assessment, monitoring, forecasting, and sustainable management of aquatic bioresources;
- comprehensive mastery of the biotechnological foundations of various forms of aquaculture (intensive, extensive, integrated), including the principles of environmental safety and economic efficiency, and the ability to design advanced and innovative aquaculture projects;
- the ability to critically analyze national and international policies, legislation, and management mechanisms related to the conservation, restoration, and sustainable use of aquatic bioresources, and to develop management strategies and recommendations based on the ecosystem approach and the precautionary principle.

Within the “Aquaculture” specialization

- the acquisition of advanced and specialized knowledge regarding the complex aspects of the biology, physiology, genetics, nutrition, health, and cultivation of various aquaculture species (fish, crustaceans, mollusks, and aquatic plants), and the ability to apply this knowledge to the design of optimal production systems;
- the ability to provide technical and economic justification for, design, optimize, manage, and comprehensively evaluate the ecological and economic efficiency of various aquaculture systems (intensive, extensive, integrated, and recirculating aquaculture systems – RAS);
- comprehensive mastery of issues related to the quality, safety, certification, and commercialization of aquaculture products, as well as the ability to implement standards and management systems ensuring the environmental sustainability and social responsibility of production.

Within the “Ichthyology” specialization

- the ability to demonstrate advanced and specialized knowledge in fish anatomy, physiology, genetics, behavior, ecology, and life-cycle strategies, and to apply this knowledge to the assessment of complex ecological conditions;
- comprehensive mastery of the principles of fish population dynamics, stock assessment, and fisheries management, as well as the ability to develop scientifically grounded strategies and management plans for sustainable fisheries, conservation, and restoration of fish stocks;
- the ability to independently select and apply advanced field and laboratory methodologies for ichthyological research (including molecular-genetic analyses, hydroacoustic, telemetry, and statistical modeling), and to interpret the obtained data at a high scientific level;
- advanced knowledge and practical skills in the diagnosis, prevention, and treatment of fish diseases, as well as in fish health management in aquaculture, and the ability to propose innovative approaches in this field.

Within the in “Hydrobiology” specialization

- critically analyze and systematically assess the complex aspects of the structure, function,

dynamics, and biodiversity of aquatic ecosystems, including contemporary theories and the impacts of global change;

- to analyze the taxonomic affiliation, morphophysiological adaptations, population dynamics, and functional roles within ecosystems of the main groups of hydrobionts (phytoplankton, zooplankton, benthos, and nekton) including their position in the food chain and their bioindicator significance — and to apply this knowledge to the assessment of the ecological status of aquatic ecosystems;
- to model and predict the complex mechanisms and consequences of anthropogenic impacts on aquatic ecosystems, and to develop innovative strategies and solutions for the sustainable management, conservation, and restoration of aquatic bioresources;
- to independently select and apply appropriate research methodologies (including field, laboratory, molecular-genetic, and remote sensing approaches) for the investigation of hydrobiological problems (such as water quality deterioration, eutrophication, and biodiversity loss), and to statistically analyze the obtained data and interpret it from an ecological perspective;
- to thoroughly master methods of comprehensive biological monitoring of water quality, bioindication, and biotesting; to assess and manage ecological risks in aquatic ecosystems and develop corresponding recommendations;
- to independently plan and manage the implementation of a scientific research project aimed at addressing a defined ecological problem in hydrobiology (e.g., pollution of a water body, decline in biodiversity), and to present the results by preparing both scientific publications and practical management recommendations;
- to critically analyze national and international policies, legislation, and management mechanisms related to hydrobiology, and to provide expert opinions and proposals for their improvement.

3. Structure of the Educational Program

3.1. The normative duration for the completion of the Educational Program and the higher scientific-professional degree awarded to graduates:

Specialization titles	Degree Awarded	Duration of full-time study	Number of Credits
Aquabioresources	Master's degree (higher academic qualification)	2 years	120
Aquaculture			
Ichthyology			
Hydrobiology			

3.2. The Educational Program shall consist of 120 ECTS credits (2 years). Each semester shall be allocated 30 credits, with a maximum of 5 courses per semester. The credits are distributed as follows:

Number	Course Title	ECTS Credit
1	Research Methods focuses on the interrelationship between quantitative and qualitative methods, measurement, research design, and data analysis. Within the scope of the course, it aims to develop research competencies, including the use of library and internet resources as sources of information, as well as the analysis, and presentation of data.	6
2	Academic Writing and Ethics The aim of this course is to teach the fundamentals of academic writing, speaking, and integrity, enabling master's students to professionally prepare scientific articles, theses, essays, and other academic documents, as well as to communicate effectively in conferences, symposia, seminars, and scientific discussions. The course also aims to develop skills in publication ethics. It will provide students with knowledge and competencies in academic style, 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, and sources of data collection, as well as the development of data analysis strategies. It includes data preparation and cleaning, data organization for analysis, and data visualization. The course also introduces relevant software used in the field for data analysis (such as "Excel", "SPSS", "Stata", "R", "MAXQDA", "MATLAB", "Python", etc.), and the application of analytical methods used in subject-specific research, including statistical tests and analyses, quantitative and qualitative methods, experimental analysis, survey and questionnaire analysis, and related approaches. Based on the results of these analyses, the course further involves the preparation of relevant reports and recommendations.	6
4	Compulsory Courses Defined by the Higher Education Institution¹ The courses included in this section, depending on the specialization, are determined individually by each higher education institution and are reflected in the educational program of the respective specialization.	72
.....	Elective courses determined by the higher education institution² Relevant courses are determined individually by each higher education institution, depending on the specialization, and are reflected in the educational program of the respective specialization	72
	Internship	
	Scientific-pedagogical internship	6
	Scientific research internship	6
	Master's thesis	
	Master's thesis	18
	TOTAL	120

1. Here, the term "courses" refers not only to traditional academic subjects but also to projects

(including “Capstone” projects), creative work, laboratory work, and other relevant learning activities (where applicable). These courses are defined by the higher education institution, considering the expertise of academic staff, research infrastructure, and local and international employment opportunities, and are mandatory for students admitted to the respective specialization. This section must include a minimum of 4 courses.

2. Here, the term “courses” refers not only to traditional academic subjects but also to projects (including “Capstone” projects), creative work, laboratory work, and other relevant learning activities (where applicable). These courses are offered by the higher education institution, considering the expertise of academic staff, research infrastructure, and local and international employment opportunities. When defining these courses, labor market requirements should also be considered, and it is recommended to establish a working group consisting of representatives from higher education institutions and the labor market for this purpose. The courses defined by the higher education institution should be elective for students and should also facilitate students’ participation in international exchange programs. This section must include a minimum of 3 courses.

4. Learning Outcomes of the Program and Individual Courses

4.1. Graduates of this Educational Program shall acquire fundamental and applied knowledge in the field of aquatic ecosystems and the management of their bioresources, as well as the in-depth competencies required to apply this knowledge to the resolution of complex and non-standard problems.

4.2. The determination of learning outcomes for each course within the specialization program, as well as the development of course syllabi, falls within the authority of the higher education institution/academic staff.

4.3. The program learning outcomes for the specialization are defined in Appendix 1. Course-level learning outcomes are determined by each higher education institution. The learning outcomes matrix (Appendix 2) shall reflect the relationship between courses and the program learning outcomes.

4.4 In order to ensure that the Educational Program provides scientific and practical content responsive to the evolving needs of society and the labor market, course syllabi shall be regularly updated.

5. Infrastructure and Human Resources Capacity

5.1. The teaching, learning, and assessment process of the Educational Program requires the higher education institution to possess the following infrastructure:

- **Teaching laboratories:** laboratories equipped for ichthyology, hydrobiology, hydrochemistry, and fish diseases;
- **Laboratory equipment:** modern microscopes, spectrophotometers, centrifuges, and both portable and stationary water quality measurement devices (e.g., oxygen meters, pH meters),

- as well as PCR equipment;
- **Experimental facilities:** experimental aquaria, recirculating aquaculture systems (RAS), and open pond systems;
 - **Field research equipment:** various types of fishing nets, boats, GPS devices, and echo sounders (fish finders);
 - **Software:** licensed versions of statistical analysis software such as STATA, Excel, and SPSS, as well as GIS software for spatial analysis (ArcGIS, QGIS);
 - **Access to scientific databases:** online access to international scientific publications (Web of Science, Scopus, Springer, Wiley).
- 5.2.** The academic staff involved in teaching at higher education institutions shall, as a rule, hold an academic degree. Specialists without an academic degree but with at least 5 years of relevant professional experience in the field may also be involved in teaching activities.
- 5.3.** Scientific supervision of master's dissertations shall, as a rule, be carried out by individuals holding an academic title and/or academic degree.

6. Career opportunities and lifelong learning

6.1. Graduates of the **7005013 – “Water Bioresources and Aquaculture”** program will be able to work in the following fields and professions:

Within the “Aquabioresources” specialization

- Researcher in scientific-research institutes;
- Manager and specialist in higher education, secondary specialized education, and vocational education institutions;
- Aquaculture farm manager (ichthyologist/fish specialist);
- Fish feed production technologist;
- Specialist in recirculating aquaculture systems (RAS);
- Breeding geneticist;
- Specialist in the organization and supervision of aquaculture farms at the Ministry of Agriculture;
- Specialist in the industrial-scale cultivation of economically valuable algae;
- Technologist and manager in seafood production in the private sector;
- Specialist / inspector in plant aquaculture at state agencies (Ministry of Ecology and Natural Resources, Ministry of Agriculture);
- Aquaponics specialist.

Within the “Aquaculture” specialization

- Researcher in scientific-research institutes;
- Manager and specialist in higher education, secondary specialized education, and vocational education institutions;
- Fisheries specialist/inspector in state bodies (Ministry of Ecology and Natural Resources, Ministry of Agriculture);
- Ichthyologist in modern fish hatcheries and commercial fish farms;
- Laboratory manager/engineer in modern fish hatcheries and commercial fish farms;
- Specialist in aquatic bioresource conservation in national parks and protected areas;

- Project coordinator in local and international organizations;
- Environmental assessment monitoring supervisor.

Within the “Ichthyology” specialization

- Researcher at scientific research institutes
- Administrator and specialist in higher, secondary specialized, and vocational education institutions
- Laboratory assistant / specialist in ecological monitoring and water quality control laboratories
- Ichthyopathologist at veterinary-sanitary service centers
- Collection manager / specialist at natural history museums.

Within the “Hydrobiology” specialization

- Researcher in scientific-research institutes;
- Manager and specialist in higher education, secondary specialized education, and vocational education institutions;
- Laboratory assistant/specialist in environmental monitoring and water quality control laboratories;
- Curator/specialist in natural history museums;
- Specialist in various institutes and central laboratories of the State Water Resources Agency.

6.2. Higher education institutions should conduct regular surveys on the employability of graduates of the educational programme and publish information on vacant job positions on their websites.

6.3. Individuals who have completed the master’s level of higher education (and defended their master’s thesis), or whose education is deemed equivalent, may be admitted to doctoral studies under a PhD programme.

6.4. The knowledge, skills, and competencies acquired during the period of study constitute a prerequisite for graduates’ independent lifelong learning.