



**K. Turysov Institute of Geology and Oil and Gas Engineering
Department of Hydrogeology, Engineering and Petroleum Geology**

EDUCATIONAL PROGRAM
7M08601 "Water Resources and Water Use"
code and name of the educational program

Code and classification of the field of education: 7M08 Agriculture and bioresources.

Code and classification of training areas: 7M08601-Water resources and water use

Group of educational programs: M137 – Water resources and water use.

NQF level: 7

ORK level: 7

Duration of study: 2

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Educational program 7M08601 "Water Resources and Water Use"
approved at the meeting of the Academic Council of KazNITU named after K.I. Satpayev .

Protocol No. 10 dated "06" 03_2025

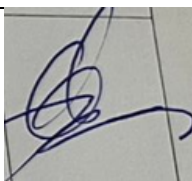
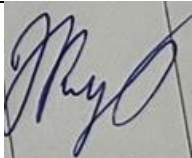
Reviewed and recommended for approval at a meeting of the Educational and Methodological Council of KazNITU named after K.I. Satpayev .

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Educational program 7M08601 "Water Resources and Water Use"

code and name of the educational program

developed by the academic committee for the field of "Water Resources and Water Use"

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List of abbreviations and designations

BD – basic disciplines
GOSO – state compulsory education standard
DP – documented procedure
DOT – distance educational technologies
UNT – Unified National Testing
IEP – individual educational plan
KTO – credit-based learning technology
KED – catalog of elective courses
MES RK – Ministry of Education and Science of the Republic of Kazakhstan
MOP – modular educational program
R&D – scientific research work
R&D and ID - scientific research work and innovation activities
NIRS – students' scientific research work
OOD – general education disciplines
OP – educational program
PD – major disciplines
PC – personal computer
PPS – professorial and teaching staff
RK – Republic of Kazakhstan
RUP – working curriculum
QMS – quality management system
SRD – independent work of students
SRDP – independent work of students under the guidance of a teacher
ТҮІІЛ – standard curriculum
UVP – educational and support personnel
UMKD – educational and methodological complex of disciplines
UMS – educational and methodological council
UMR – educational and methodological work
EUM – electronic educational materials

1. Description of the educational program

The educational program (hereinafter, EP) is a set of documents developed by the Kazakh National Research Technical University named after K.I. Satpayev and approved by the Ministry of Education and Science of the Republic of Kazakhstan. Bachelor's degree training in educational program 6B08601-Water Resources and Water Use is carried out with the assignment of the qualification - Bachelor of Agriculture. The duration of study for full-time is 4 years, for distance (correspondence) learning (after higher education) - 3 years. The main characteristics and trends of the training areas for specialists in the training area 6B08601-Water Resources and Water Use correspond to the Classifier of training areas for personnel with higher and postgraduate education of the Republic of Kazakhstan.

The OP takes into account the needs of the regional labor market, the requirements of government agencies and relevant industry requirements and is based on the state educational standard for higher professional education in the relevant field.

The educational program defines the program's educational objectives, student learning outcomes, the necessary conditions, content, and technologies for implementing the educational process, as well as the assessment and analysis of student performance during and after completion. The educational program includes the curriculum, course content, learning outcomes, and other materials to ensure high-quality student education.

OP 6B08601 "Water Resources and Water Management" aims to assist students, faculty, and industry experts in understanding the structure of the educational process and demonstrating how the curriculum and course content contribute to the development of essential core competencies upon completion of the program. Last but not least, the OP aims to establish a common basis for the feasibility and necessity of the "Water Resources and Water Management" training program for all stakeholders, including government, public authorities, the water industry, universities, parents and students, and the community. It is designed to provide specialized training for bachelor's degree students in the "Water Resources and Water Management" program at Satbayev University. University and was developed within the framework of the 6B08 Agriculture and Bioresources direction.

This document meets the requirements of the following legislative acts of the Republic of Kazakhstan and regulatory documents of the Ministry of Education and Science of the Republic of Kazakhstan:

- The Law of the Republic of Kazakhstan "On Education" with amendments and additions within the framework of legislative changes to increase the independence and autonomy of universities dated 04.07.18 No. 171-VI.
- Law of the Republic of Kazakhstan "On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on Issues of Expanding the Academic and Managerial Independence of Higher Education Institutions" dated 04.07.18 No. 171-VI.
- Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595 "On approval of the Model Rules for the activities of educational organizations of the corresponding types."
- State Compulsory Standard of Higher Education (Appendix 7 to the Order of the Minister of Education and Science of the Republic of Kazakhstan dated

10/31/18 No. 604.

- Resolution of the Government of the Republic of Kazakhstan dated 19.01.12 No. 111 "On approval of the Model Rules for Admission to Educational Organizations Implementing Higher Education Programs" with amendments and additions dated 14.07.16 No. 405.
- Resolution of the Government of the Republic of Kazakhstan dated 13.08.12 No. 1042 "On approval of the Concept for the development of the geological industry until 2030".
- The Law on Subsoil and Subsoil Use and the draft Code on Subsoil and Subsoil Use.
- Code of public reporting of exploration results, mineral resources and reserves of KAZRC.
- Concept of the State Program for Geological Exploration for 2021–2025, January 31, 2020
- "National Qualifications Framework", approved by the protocol of March 16, 2016, of the Republican Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations.

2. The purpose and objectives of the educational program

of the educational program "Water Resources and Water Use" is to train highly qualified, competitive specialists in the field of water resource management and use, including groundwater resources, as well as in the design and operation of water management systems and structures. The program culminates in the award of a Bachelor of Agriculture degree.

The goal of the OP 6B08601 - "Water Resources and Water Use" is to prepare qualified bachelors capable of solving problems in the field of water resources management and focused on solving professional issues of rational use, distribution and management of water resources based on fundamental knowledge in accordance with the requirements of state and international standards.

Sphere of professional activity :

Natural objects in the form of geographical components of geosystems of various levels: surface and underground waters, air masses of the troposphere, natural-technological complexes, anthropogenic landscapes, settlements, energy, health, recreational, historical, cultural and scientific facilities.

2.1 Objects of professional activity :

The objects of professional activity of graduates are

- water management and hydropower systems, complexes, enterprises ;
- hydraulic structures for various purposes : spillways, water outlets, water intakes, hydroelectric power stations, pumping stations, fish protection structures;
- reclaimed lands;
- scientific research , design and engineering organizations.

2.2 Subjects of professional activity

- dams, reservoirs ;
- hydraulic engineering and hydropower structures;
- irrigation and drainage network;
- estuary systems ;

- rivers, lakes , groundwater.

2.3 Types of professional activity

Bachelor's degree in specialty 6B08601 - "Water Resources and Water Use"

can perform the following types of professional activities:

- design and engineering;
- production and technological;
- organizational and managerial;
- scientific research.

2.4 Functions of professional activity

- organize and manage the work of design, water management, hydropower, agricultural, municipal organizations and enterprises;
- carry out research work in educational institutions and research centers in water, agriculture and energy management;
- carry out examination , supervision and control over the use of water resources, audit and monitoring of water management facilities, etc.

2.5 Typical tasks of professional activity

A bachelor's degree in Water Resources and Water Use, depending on the type of professional activity, is prepared to solve the following professional problems:

a) design and engineering:

- carries out work on the creation of projects for modern, highly efficient , technically advanced water management engineering systems using an analysis of the effectiveness of the implemented engineering option in comparison with other options provided for in the design documentation;
- carries out work on designing measures for the protection and improvement of natural waters and wastewater treatment;
- participates in the development of “Schemes for the integrated use and protection of water resources”, basin agreements on the use and protection of water resources;
- carries out ecological and economic assessment of river basins, water management facilities and industries (certification of water bodies, ecological certification of water management industries).
- carries out work on the design and implementation of projects to restore the natural state of rivers and reservoirs;
- carries out expert assessments of projects affecting water and water management facilities;
- conducts environmental and economic assessments of water management projects.

b) production and technological:

- carries out work on the implementation of projects for the creation of modern, highly efficient, technically advanced engineering water management and hydropower systems, systems for the collection, supply and distribution of water for water supply and wastewater disposal;
- carries out work on the implementation of environmental improvement projects in watersheds;
- carries out work on the implementation of projects for the protection and improvement of natural waters and wastewater treatment;
- participates in conducting research to determine the initial data necessary for the design of water use and wastewater disposal facilities;

- conducts an analysis of natural conditions to determine the possibility of satisfying human economic and recreational needs for water resources in conditions of uncertainty and variability of the properties of the aquatic environment;
- participates in assessing the state of water resources and facilities, water management systems;
- carries out work on monitoring and compiling a cadastre of water bodies and resources.

c) organizational and managerial:

- carries out work on information services, organization of production, labor and management, metrological support, technical control in the field of water use;
- develops methodological and regulatory documents, technical documentation, as well as proposals and activities for the implementation of developed projects and programs in the field of water use, ensuring the trouble-free and efficient operation of all structures and elements in accordance with their purpose and design parameters;
- participates in the implementation of work on the standardization of technical means, systems, processes, equipment and materials, in the review of technical documentation and the preparation of necessary reviews, feedback, and conclusions on issues of the work being performed;
- facilitates the provision of water supply enterprises with the necessary technical data, documents, materials, and equipment;
- participates in the development of regulations and provisions on the use and protection of water bodies and resources; carries out expert assessments of projects that affect them;
- participates in the verification of compliance with water legislation and rules for the protection of water resources, exercises control over the restoration of damaged natural waters, participates in the regulation of relations between water users, and the maintenance of the state water cadastre ;
- inspects the work of water management, water protection, enterprises and organizations;
- prepares work schedules, orders, applications, instructions, explanatory notes, maps, diagrams, other technical documentation, as well as established reporting in accordance with approved forms and within specified timeframes ;
- provides methodological and practical assistance in the implementation of projects and programs, plans and agreements;
- carries out examination of technical documentation, supervision and control over the condition and operation of equipment;
- monitors compliance with established requirements, current norms, rules and standards.

d) research:

- participates in research into processes arising during water use, the implementation of measures to protect water bodies, and the prevention and elimination of the consequences of their pollution as a result of anthropogenic activities;
- studies and analyzes the results of work on water use, summarizes and systematizes them in order to predict expected changes in the hydrogeological and hydrological regimes of waters.

Tasks of the OP:

- study of a cycle of *general educational disciplines* to ensure social and humanitarian education based on the laws of social and economic development of society, history, modern information technologies, the state language, foreign and Russian languages;
- study of a cycle of *basic disciplines* to ensure knowledge of natural science, general technical and economic disciplines, as the foundation of professional education;
- the cycle of *specialized disciplines* is focused on the study of disciplines that form knowledge, skills and abilities in planning and organizing research, designing water management works;
- familiarization with technologies and equipment of enterprises during various types of internships.
- acquisition of theoretical knowledge and practical skills in solving hydraulic and hydrotechnical problems related to the design, construction and operation of hydraulic structures;
- students will acquire deep theoretical knowledge in the field of hydraulic and hydrotechnical calculations, designs and composition of hydraulic structures of water management complexes, and use this knowledge in the design, construction and operation of water management facilities for hydropower, land reclamation, water supply and other purposes.

3. Requirements for the assessment of educational learning outcomes programs

Results development OOP b bakalavra are determined acquired graduate competencies And his ability apply formed general cultural, general professional And professional competencies V in accordance With tasks of professional activity.

IN result development OOP graduate must have next competencies:

A) general cultural (OK):

- ability use basics philosophical knowledge For formations ideological positions (OK-1);
- the ability to analyze the main stages and patterns of historical development society For formation of civil positions (OK-2);
- the ability to use the basics of economic knowledge in various spheres life activity (OK-3);
- ability use basics legal knowledge V various spheres vital activity (OK-4);
- ability to communicate orally and in writing Russian and foreign languages For solutions tasks interpersonal And intercultural interactions (OK-5);
- ability work V team, tolerantly perceiving social, ethnic, confessional And cultural differences (OK-6);
- ability To self-organization And self-education (OK-7);
- ability use methods And means physical cultures For provision full-fledged social And professional activities (OK-8);

- the ability to use first aid techniques, methods of protection in conditions emergency situations (OK-9);

- b) general professional competencies (OPK):

- ability to be aware social significance his own future professions, possession high motivation To execution professional activities (OPK-1);

- possession performances O modern scientific painting peace on basis knowledge of the fundamental principles of philosophy, basic laws and methods of natural sciences (OPK-2);

- the ability to use basic knowledge in professional activities mathematicians and natural sciences (OPK-3);

- ability decide standard tasks professional activities on on the basis of information and bibliographic culture with the use of information communication technologies And With taking into account main requirements informational security (OPK-4);

- the ability to use industry-specific regulatory and legal documents in his own professional activities (OPK-5).

- V) professional competencies (PC):

- IN areas research activities:

- Independently understand and apply appropriate methods of analysis, collect and integrate information in the best possible way according to the standards of the geological, hydrogeological and geoecological industry, the ability use knowledge V areas geology, geophysics, geochemistry, hydrogeology And engineering geology, geoecology, ecological hydrogeology For solutions research tasks related their use in construction and organization of water supply from groundwater (PC-1);

- Defend your own point of view on a professional problem, argue original ideas when solving problems of monitoring, forecasting and managing risks associated with ecology, the ability on one's own receive geological, hydrogeological, engineering and geological information, use V research activities skills field And laboratory hydrogeological, engineering geological And environmental research (PC-2);

- Demonstrate a high level of skills in setting strategic hydrogeology objectives, project management and defending conclusions and results as intellectual property on a global scale, the ability V composition scientific research team participate V interpretations geological, hydrogeological, engineering and geological information, compilation reports, abstracts, bibliographies By topic scientific research, V preparation of publications (PC-3);

- IN areas scientific and industrial activities:

- Able to demonstrate high professional qualities and ethics when interacting with various stakeholders. Readiness to apply basic general professional knowledge in practice and skills field geological, geophysical, geochemical, hydrogeological, oil and gas And ecological and geological works at decision production tasks related With provision construction And operation buildings And structures, organizations

and operation of systems water supply (PK-4);

- Demonstrate scientific writing skills, high professional qualities and research ethics in scientific communication in the state, Russian and foreign languages with various stakeholders, readiness to work in modern field and laboratory geological, geophysical, geochemical, hydrogeological, engineering-geological instruments, installations and equipment (PC-5);

- Demonstrate knowledge of modern scientific research methods and the ability to apply them in carrying out scientific projects and research in the field of environmental protection V composition scientific and production team participate V drawing up maps, diagrams, sections, and other established reports on approved forms (PC-6).

Correspondence required competencies And composite parts OOP given V matrix and a competency map .

4. Passport of the educational program

4.1. General information

No.	Field name	Note
1	Code and classification of the field of education	7M 08 Agriculture and Bioresources
2	Code and classification of training areas	7M 08601 Water resources and water use
3	Group of educational programs	In 137 Water resources and water use
4	Name of the educational program	Water resources and water use
5	Brief description of the educational program	Water resources and water use is a science that studies the origins of modern water management policy. The objectives are the basic methods and principles of the integrated use of water resources, their current state and the most complete and economically feasible satisfaction of the needs of water users and consumers, taking into account the preservation of nature and the protection of water from pollution and depletion.
6	The purpose of the OP	The goal of the "Water Resources and Water Use" educational program is to train highly qualified, competitive specialists in water resource management and use, including groundwater resources, as well as in the design and operation of water management systems and structures. The program culminates in a Bachelor of Agriculture degree. To prepare qualified bachelors capable of solving problems in the field of water resources management and focused on solving professional issues of rational use, distribution, and management of water resources based on fundamental knowledge in accordance with the requirements of national and international standards.
7	Type of OP	production and technological; organizational and managerial; experimental research : calculation, design and analytical
8	NQF level	7
9	Level according to the ORK	7
10	Distinctive features of the OP	The most important feature of the object of research on the environmental principles of nature conservation and rational use of natural resources, the prospects for the creation of non-destructive technologies, the latest discoveries in natural science, the prospects for their use in the construction of technical devices, the methodology of environmental justification of engineering projects, methods of designing and calculating hydraulic and hydroelectric structures, the principles of the layout of hydraulic structures, the principles of using water energy, rules for the technical operation of hydraulic structures, methods for obtaining and processing information on the state of the environment and engineering facilities, basic laws of environmental protection, laws and rules for the use of water and land resources. At the moment, the specialty of water resources and water use is in demand more than ever, given in the field of design, construction and operation of water management, irrigation and drainage and hydropower facilities.
11	List of competencies of the educational program:	Natural scientific and theoretical-ideological competencies; Social, personal and civic competencies; General engineering professional competencies Communication and IT virtual competencies

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12	Learning outcomes of the educational program:	To be able to navigate the current economic, political and cultural situation. Be able to communicate (orally and in writing) in a foreign language on professional and everyday topics. Be able to solve applied problems in the field of professional activity. To determine and recommend the most optimal method for the rational use and protection of water resources, design, construction and operation of water management and hydropower systems. Classify natural objects in the form of geographical components of geosystems of various levels: surface and underground waters, tropospheric air masses, natural- technological complexes, anthropogenic landscapes, populated areas, energy, health, recreational, historical, cultural and scientific facilities. Apply modern technology methods to the design, construction and operation of water management and hydropower facilities, complex hydroelectric complexes and hydraulic structures, hydroelectric and pumping stations; assess their economic efficiency and environmental safety, manage water management systems, and use technological methods for the operational management of water and other soil regimes. Conduct soil, hydrogeological, hydrometric, geodetic surveys, Process and use survey results, receive and process information on the state of the environment and engineering facilities. To use physical principles, mathematical algorithms of analysis and other fundamental sciences when carrying out scientific and applied research in the water management industry. Apply modern methods to solve water management problems, conduct soil, hydrogeological, hydrometric, geodetic surveys, process and use the results of the surveys, receive and process information on the state of the environment and engineering facilities.
13	Form of study	full-time
14	Duration of study	2 years
15	Volume of loans	120
16	Languages of instruction	Russian, Kazakh, English
17	Awarded academic degree	bachelor
18	Developer(s) and authors:	Absametov M.K., Auelkhan E.S., Tasbolat A.R.

4. 2. Interrelationship attainability generated results training By educational program And educational disciplines

No .	Name of the discipline	Brief description of the discipline	Numbe r of credits	Formed learning outcomes (codes)							
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	
Cycle general education disciplines University component											
	Foreign language (professional)	Advanced proficiency in professional English (for non-linguistic fields). Study of the grammatical characteristics of scientific style in both oral and written forms. Professional oral communication in monologue and dialogue as required by the curriculum. Ability to present research results in reports, essays, publications, and public discussions; interpret and present scientific research findings in a foreign language.	5	v							
	History and philosophy of science	Objective : To explore the history and philosophy of science as a system of concepts in global and Kazakhstani science. Contents: The subject of the philosophy of science, the dynamics of science, the main stages of the historical development of science, the characteristics of classical science, non-classical and post-non-classical science, the philosophy of mathematics, physics, engineering, and technology, the specifics of engineering, the ethics of science, and the social and moral responsibility of scientists and engineers.	5		v						
	Pedagogy of Higher Education	This course focuses on mastering the methodological and theoretical foundations of higher education pedagogy. This course will help students develop skills in modern teaching technologies, pedagogical design, organization, and control in higher education, and communicative competence. Upon completion of the course, master's students will learn how to organize and implement various forms of learning, apply active learning methods, and select lesson content. They will also learn how to organize the learning process using credit-based learning.	5	v							
	Psychology of Management	This course focuses on mastering the tools of effective employee management, drawing on an understanding of the psychological mechanisms of leadership. This course will help students develop skills in decision-making, creating a positive psychological climate, motivating employees, setting goals, building a team, and communicating with employees. Upon completion of the course, master's students will learn how to resolve management conflicts, develop their own image, analyze management situations, conduct negotiations, and become stress-resistant and effective leaders.	5			v					

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Cycle of basic disciplines												
Optional component												
Remote sensing of the environment	This course examines fundamental issues in modeling occupational safety and health at an enterprise. The material is presented in accessible language with illustrations and examples. This course is designed for first-year master's students. It will allow master's students to reflect on the knowledge they acquired in their undergraduate program and gain a more comprehensive understanding of their chosen specialty.	5	v									
Study of the regime and balance of groundwater	The course aims to introduce students to the components of the water balance of various hydrodynamic regions and zones, the causes of flooding, and predicted changes in groundwater levels. It also reflects changes in the quantity and quality of groundwater over time. The balance can be compiled for large areas or for individual sections. It characterizes the water supply of an area and the potential for annual groundwater replenishment.	5	v									
Intellectual property and scientific research	This course aims to provide master's students with the knowledge and skills necessary to understand, protect, and manage intellectual property (IP) in the context of scientific research and innovation. It is designed to train specialists capable of effectively working with IP, protecting the results of scientific research, and applying them in practice.	5				v						
Use of remote sensing in water management	The purpose of mastering the course is to provide students with theoretical knowledge about the methods of obtaining, converting, processing, classifying, and using remote sensing data from the Earth for applied purposes and for environmental protection, obtaining information about the underlying surface using remote measurement methods from artificial Earth satellites, laboratory aircraft, ground-based radar stations, laser and other optical installations.	5					v					
Monitoring of water bodies and geographic information systems	The objective is to study the monitoring of water bodies, the basic principles of forming a water body monitoring system, the main components of the basin monitoring system, the subjects of the monitoring system, the current state of water body monitoring, the activities of the state water resources observation network, the possibilities of using geographic information technologies and systems (GIS) for monitoring water resources, the process of implementing water body monitoring, the monitoring cycle .	4		v				v				
Organization and management of hydraulic engineering construction	The objectives of this course are: Knowledge of the organization and planning systems for individual construction projects and construction in general, knowledge of management methods, and the ability to create and optimize schedules. This discipline studies the system of measures aimed at rationally combining all elements of construction processes and activities in space and time during the preparation and construction of structures, particularly hydraulic engineering structures.	5		v								

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Organization of production and management of a water management enterprise	The course aims to explore theoretical and practical aspects of enterprise operations and production organization for management decision-making, taking into account their dynamics in the context of Kazakhstan. The course is designed to explore the theoretical foundations and master practical skills in production organization, as well as to develop analytical skills in reviewing and analyzing enterprise operations and making business decisions.	6				v					
Sustainable development strategies	Objective: To train master's students in sustainable development strategies to achieve a balance between economic growth, social responsibility, and environmental protection. Content: Master's students will study the concepts and principles of sustainable development, the development and implementation of sustainable development strategies, the evaluation of their effectiveness, as well as international standards and best practices. Case studies and examples of successful sustainable development strategies are included.	5				v					
Cycle of basic disciplinesComponent by choice Cycle of core disciplines (CD)											
Cycle of core disciplines University component											
Water-saving irrigation technologies	This course will teach the student the practical principles of water-saving crop irrigation technologies and the fundamentals of efficient water resource use in Kazakhstan. Students will gain basic knowledge and skills in sprinkler irrigation systems, subsurface irrigation systems, and micro-irrigation . Upon completion, students should demonstrate the ability to analyze, synthesize, make decisions, and design water-saving irrigation technologies.	5								v	
Integrated water resources management	This course will teach master's students the practical principles and tools of integrated water resources management. It will provide fundamental knowledge and skills about integrated water resources management systems. The course materials also contain a wealth of useful information on the status of water basins, basin-wide management systems, division of responsibilities, and industry development prospects. Upon completion of the course, master's students should demonstrate the ability to analyze, synthesize, and make decisions in water management.	5								v	
Mathematical and computer modeling of water management problems	The objective of this course is to study the fundamentals of mathematical and computer modeling, the classification of mathematical models, the construction of mathematical and computer models of various systems, and their study using numerical modeling, the planning of numerical experiments, and the interpretation of the results. Upon completion of this course, the master's student should be able to: statistical data analysis, correlation analysis to identify relationships between water management objects	6									v

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Fundamentals of scientific research in the field of water management	The objectives of this course are to develop knowledge of the fundamental methods for solving scientific and applied problems, to develop the ability to use modern methods of scientific cognition and creativity in work, to modify existing methods, and to develop new methods in accordance with the tasks set; to process the obtained results, analyze and comprehend them; to understand the fundamentals of scientific research; and to understand the fundamentals of analytical and experimental methods of scientific research.	5										v
Modern problems of science in the field of environmental protection	The purpose of mastering the course: to develop theoretical knowledge on "Modern Problems of Science in the Field of Environmental Protection"; to develop and improve practical skills for information support of the research process. Objectives: to acquire skills in the practical application of knowledge in the field of environmental legislation, regulatory and legal documentation of regional executive authorities aimed at resolving environmental problems and eliminating negative factors in this area; to study methods for forming a research information base; to develop skills in professional visualization and presentation of research results.	5										v
Cycle of basic disciplinesComponent by choice												
Cycle of core disciplines (CD)												
Restoration of rivers and reservoirs	The objective of this course is to provide students with theoretical and practical skills in justifying measures to improve the regime and condition of rivers and water bodies, as well as their design, planning, and implementation. This course provides an understanding of the key issues in the use and protection of rivers and water bodies and the scientific basis for addressing these issues; principles for identifying the causes of water body degradation; and principles and rules for the economic use of river and water body resources.	5										v
Integrated melioration of river basin catchments	The goal of this course is to develop theoretical and practical knowledge about the goals and programs of watershed reclamation, as well as the necessity and nature of agricultural land reclamation in watersheds. During this course, students gain knowledge of irrigation reclamation and irrigation systems in agricultural lands within watersheds. The course also covers regular irrigation regimes, methods, and techniques for watering agricultural crops.											
International and state relations in the field of water use	The purpose is to use water bodies for drinking and domestic water supply . A general description of water legal relations is provided: the basic principles, key concepts, and system of water legislation are revealed, water bodies are classified, and the range of participants in water relations is established.											
Membranes and membrane processes in water treatment	The goal of this course is to develop a comprehensive understanding of modern membrane technologies for protecting the biosphere from anthropogenic impacts and their potential applications. This course aims to provide master's students with fundamental knowledge in membrane science and the application of											

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	technologies	membrane technologies in water treatment. Topics include: types of membranes and membrane structures, basic principles of membrane production, general theory of membrane transport, and the membrane separation process.										
	Best available technologies for water treatment	The objective of this course is to study water treatment methods and technologies, as well as the operation and design of water treatment facilities. Best available technology (BAT) is a technology based on the latest advances in science and technology, aimed at reducing the negative impact on the environment, and with a defined period of practical application, taking into account economic and social factors. The objective of this course is to acquire skills in selecting the structure of a facility, determining the quality of water treatment, and mastering the operating modes of water treatment technologies.	5									
	Evaluation and examination of water management projects	Objective: This course aims to provide theoretical and practical knowledge in the field of environmental assessment and review of water management projects. Summary: This course aims to provide theoretical and practical knowledge in the field of environmental assessment and review of water management projects. Expected results: Establishment of the concepts and objectives of environmental assessment and review of water management projects; study of methods of environmental assessment and review of water management projects; evaluation of regulatory acts on impact assessment.	5									v
	Acceptance, commissioning and operation of water supply and sanitation systems	The purpose of this course is to study the rules for operating networks and structures and to acquire skills for training specialists in the field of operating water supply and sanitation systems. The objectives of this course are: studying the rules for the technical operation of water supply and sanitation systems and their equipment; the procedure for maintaining technical documentation and reporting; familiarization with instructions that define the rights, duties, and responsibilities of maintenance personnel.										
	Regulation of river beds	The objective of this course is to develop master's degree students' scientific knowledge of the complex processes and phenomena associated with water flows on the earth's surface, where flows and catchments are considered in close interaction and as a single complex. The objectives of this course are: - to familiarize master's degree students with the general concepts of erosion and accumulation processes; - to develop knowledge of the characteristics of channel processes in various physical and geographical conditions;										
	Repair and reconstruction of water supply and sanitation systems	The objective of the course is to develop students' knowledge of the design solutions for major buildings, water supply and sanitation systems, and mechanization techniques in construction, to acquire skills in designing building structures, to develop competencies in developing projects for the reconstruction and intensification of the operation of engineering systems and water supply and sanitation structures in populated areas and industrial enterprises, and to										

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		rationaly use material and energy resources during the reconstruction of water supply and sanitation systems.										
	Construction, repair and reconstruction of hydraulic structures	The objective of the course is to provide students with the knowledge and skills necessary for the design, construction, operation, repair, and reconstruction of hydroelectric power plants. Upon completion of the course, the student should: Know: - the role of hydraulic structures in energy (according to the Federal State Educational Standard); - schemes for the use of hydroelectric resources; - features and operating principles of hydroelectric structures for various purposes (according to the Federal State Educational Standard); - types of hydraulic machines, their design, and operating principles;	2				v					

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5. Curriculum of the educational program

NON-PROFIT JOINT STOCK COMPANY
"KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY NAMED AFTER K.I. SATPAEVA"



«APPROVED»
Decision of the Academic Council
NPJSC «KazNRTU»
named after K.Satbayev»
dated 06.03.2025 Minutes № 10

WORKING CURRICULUM

Academic year
Group of educational programs
Educational program
The awarded academic degree
Form and duration of study

2025-2026 (Spring, Autumn)
M137 - "Water resources and water use"
7M08601 - "Water resources and water use"
Master of Agriculture
full time (scientific and pedagogical track) - 2 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	Lec/lab/pr Contact hours	in hours SIS (including TSIS)	Form of control	Allocation of face-to-face training based on courses and semesters				Prerequisites
									1 course		2 course		
									1 sem	2 sem	3 sem	4 sem	
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)													
CYCLE OF BASIC DISCIPLINES (BD)													
M-1. Module of basic training (university component)													
HUM212	History and philosophy of science		BD, UC	3	90	150/15	60	E	3				
HUM213	Higher school pedagogy		BD, UC	3	90	150/15	60	E	3				
LNG213	Foreign language (professional)		BD, UC	3	90	0/0/30	60	E		3			
HUM214	Psychology of management		BD, UC	3	90	150/15	60	E		3			
GIG225	Monitoring of water bodies and geoinformation systems	1	BD, CCH	5	150	300/15	105	E		5			
MNG781	Intellectual property and research	1	BD, CCH	5	150	300/15	105	E		5			
GIG226	Study of the regime and balance of groundwater	1	BD, CCH	5	150	300/15	105	E		5			
GIG244	Use of remote sensing in water management	2	BD, CCH	5	150	300/15	105	E		5			
MNG782	Sustainable development strategies	2	BD, CCH	5	150	300/15	105	E		5			
GIG227	Remote sensing of the environment	2	BD, CCH	5	150	300/15	105	E		5			
GIG228	Organization of production and management of a water management enterprise	1	BD, CCH	5	150	300/15	105	R			5		
GIG229	Organization and management of hydraulic engineering construction	1	BD, CCH	5	150	300/15	105	E			5		
M-4. Practice-oriented module													
AAP273	Pedagogical practice		BD, UC	8				R		8			
CYCLE OF PROFILE DISCIPLINES (PD)													
M-2. Rational use and management of water resources (university component)													
GIG232	Water saving irrigation technologies		PD, UC	5	150	300/15	105	E	5				
GIG233	Mathematical and computer modeling of water management problems		PD, UC	5	150	300/15	105	E	5				
GIG230	Integrated Water Resources Management		PD, UC	5	150	300/15	105	E		5			
GIG231	Fundamentals of scientific research in the field of water management		PD, UC	5	150	300/15	105	E			5		
M-3. Reconstruction and operation of water management systems and structures (component of choice)													
GIG236	Restoration of rivers and reservoirs	1	PD, CCH	5	150	300/15	105	E	5				
GIG237	River regulation	1	PD, CCH	5	150	300/15	105	E	5				
GIG238	Best Available Technology for Water Treatment	2	PD, CCH	5	150	300/15	105	E	5				

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GIG239	Integrated reclamation of the catchment area of river basins	2	PD, CCH	5	150	30.0/15	105	E	5				
GIG234	Construction, repair and reconstruction of hydraulic structures	1	PD, CCH	5	150	30.0/15	105	E			5		
GIG235	Repair and reconstruction of water supply and sanitation systems	1	PD, CCH	5	150	30.0/15	105	E			5		
GIG240	Membranes and membrane processes in water treatment technologies	2	PD, CCH	5	150	30.0/15	105	E			5		
GIG241	International and state relations in the field of water use	2	PD, CCH	5	150	30.0/15	105	E			5		
GIG242	Acceptance, adjustment and operation of water supply and sanitation systems	3	PD, CCH	5	150	30.0/15	105	E			5		
GIG243	Assessment and expertise of water management projects	3	PD, CCH	5	150	30.0/15	105	E			5		
GIG245	Modern problems of science in the field of environmental protection		PD, UC	4	120	30.0/15	75	E				4	
M-4. Practice-oriented module													
AAP256	Research practice		PD, UC	4				R				4	
M-5. Experimental research module													
AAP268	Research work of a master's student, including internship and completion of a master's thesis		RWMS	4				R	4				
AAP272	Research work of a master's student, including internship and completion of a master's thesis		RWMS	1				R		1			
AAP254	Research work of a master's student, including internship and completion of a master's thesis		RWMS	5				R			5		
AAP255	Research work of a master's student, including internship and completion of a master's thesis		RWMS	14				R				14	
M-6. Module of final attestation													
ECA212	Registration and protection of the master thesis		FA	8								8	
Total based on UNIVERSITY:									30	30	30	30	
									60	60			

Number of credits for the entire period of study

Cycle code	Cycles of disciplines	Credits			
		Required component (RC)	University component (UC)	Component of choice (CCH)	Total
GED	Cycle of general education disciplines	0	0	0	0
BD	Cycle of basic disciplines	0	20	15	35
PD	Cycle of profile disciplines	0	28	25	53
Total for theoretical training:		0	48	40	88
RWMS	Research Work of Master's Student				24
ERWMS	Experimental Research Work of Master's Student				0
FA	Final attestation				8
TOTAL:					120

Decision of the Educational and Methodological Council of KazNRTU named after K.Satpayev. Minutes № 3 dated 20.12.2024

Decision of the Academic Council of the Institute. Minutes № 3 dated 28.11.2024

Signed:

Governing Board member - Vice-Rector for Academic Affairs

Uskenbayeva R. K.

Approved:

Vice Provost on academic development

Kalpeyeva Z. B.

Head of Department - Department of Educational Program Management and Academic-Methodological Work

Zinnagaliyeva A. S.

Director - Geology and Oil-gas Business Institute named after K. Turyshev

Azyeldkhun Y. .

Acting Department Chair - Hydrogeology, Engineering and Oil and Gas Geology

Akpanbayev R. C.

Representative of the Academic Committee from Employers
____Acknowledged____

Umbetaliyev D. B.



Note:

1. The departments themselves prescribe the names of the modules and their number for the basic training and professional activity module.
2. * - Division into types of work at the discretion of the department
3. If necessary, the disciplines: Physics II, Mathematics III, General Chemistry of the department are included at the expense of credits of the component of the department of BD, VK from the basic training module
4. The total academic load for one academic year must be 60 academic credits.
5. The application of the catalog of elective courses, just like the Curriculum, is divided into modules, with the inclusion of the R&D Module

