



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

EDUCATIONAL PROGRAM
6B05204 Hydrogeology and geoecology
code and name of the educational program

Code and classification of the field of education: 6B05 Natural Sciences, mathematics and statistics

Code and classification of training directions: 6B052 Environment

Group of educational programs: B052 Earth Science

Level based on NQF: 6

Level based on IQF: 6

Study period: 4

Amount of credits: 240

Almaty 2025

The educational programme 6B05204 - "Hydrogeology and geoecology" was approved at the meeting of K.I. Satbayev KazNRTU Academic Council

Minutes # 10 dated «06 » 03 2025.

was reviewed and recommended for approval at the meeting of K.I. Satbayev KazNRTU Educational and Methodological Council

Minutes # 3 dated «20 » 12 2025 .

Educational program 6B05207 "Geology of fossil fuels" was developed by the Academic Committee in the field of "Environment"

Full name	Academic degree / academic title	Position	Place of work	Signature
Chairman of the Academic Committee:				
Absametov M. K.	Doctor of Geological and Mineralogical Technical Sciences Professor	Director	Institute of hydrogeology and geoecology of Akhmedsafin	
Teaching staff:				
Auelkhan E. S.	Candidate of Technical Sciences	Associate Professor	NCJS «Kazakh national research technical university named after K.I.Satbayev», mobile phone: +7 707 829 01 61, y.auyelkhan@satbayev.university	
Zapparov M. R.	Candidate of Geological and Mineralogical Technical Sciences	Associate Professor	NCJS «Kazakh national research technical university named after K.I.Satbayev», Mobile phone number: +7 777 297 08 98, m.zapparov@satbayev.university	
Employers:				
Absametov M. K.	Doctor of Geological and Mineralogical Technical Sciences Professor	Director	Institute of hydrogeology and geoecology of Akhmedsafin	

Students				
Urysbai Aizere	3rd year student OP 6B05204 "Hydrogeology and geoecology"	-	NCJS «Kazakh national research technical university named after K.I.Satbayev», mobile phone: +77476017525, aizere.urysbai.05@mail.ru	

Table of contents

	List of abbreviations and symbols
1.	Description of the educational program
2.	Purpose and objectives of the educational program
3.	Requirements for evaluating the learning outcomes of an educational program.
4.	Passport of the educational program
4.1.	General information
4.2.	The relationship between the achievability of generated learning outcomes in the following areas: about the educational program and academic disciplines
5.	Curriculum of the educational program
6.	Additional educational Programs (Minor)

List of abbreviations and symbols

DB – basic disciplines
SSO – the state mandatory standard of education
DP – documented procedure
DOT – distance learning technologies
UNT – Unified national testing
IEP – Individual curriculum
KTO-credit training technology
QED-catalog of elective subjects
Ministry of Education and Science of the Republic of Kazakhstan – Ministry of Education and Science of the Republic of Kazakhstan
MOE-modular educational program
R & D – research work
R & D and publishing - research and innovation activities
Research and Development Center – research work of students
OOD – General education subjects
OP-educational program
PD-profile disciplines
PC – personal computer
Teaching staff – faculty members
Republic of Kazakhstan – Republic of Kazakhstan
RUP – working curriculum
QMS-Quality management system
SRS – independent work of students
SRSP– independent work of students under the guidance of a teacher
TUPl – standard curriculum
ATC – Training and support staff
UMKD – educational and methodical complex of disciplines
UMS-educational and methodical Council
UMR – educational and methodical work
EUM – electronic learning materials

1. Description of the educational program

Educational program – hereinafter, OP) 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. The EP takes into account the needs of the regional labor market, the requirements of state bodies and relevant industry requirements and is based on the state educational standard for higher professional education in the relevant field.

The EP determines program educational goals, learning outcomes of students, necessary conditions, content and technologies for the implementation of the educational process, assessment and analysis of the quality of students during training and after graduation. The EP includes the curriculum, the content of disciplines and learning outcomes, and other materials to ensure a high-quality education of students.

The purpose of developing the OP "Hydrogeology and Geoecology" is to help students, teachers and industry experts understand the structure of the educational process and demonstrate how the curriculum and course content contribute to the formation of the necessary core competencies after graduation by students. Last but not least, the goal of the EP is to establish a common framework for the feasibility and necessity of a Hydrogeology and Geoecology training program for all stakeholders, including government, public authorities, the hydrogeological industry, universities, parents and students, and the community. It is intended for the implementation of specialized training of bachelors in the educational program of the specialty "Hydrogeology and Geoecology" at Satbayev University and was developed within the framework of the direction "Earth Science".

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:

- Law of the Republic of Kazakhstan "On Education" with amendments and additions in 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 expanding the academic and managerial independence of higher educational Institutions" dated 04.07.18 No. 171-VI.
- Order of the Minister of Education and Science of the Republic of Kazakhstan dated 30.10.18 No. 595 "On approval of Standard rules of activity of educational organizations of corresponding types".
- State mandatory standard of Higher education (Appendix 7 to the Order of the Minister of Education and Science of the Republic of Kazakhstan No. 604 dated 31.10.18.
- Resolution of the Government of the Republic of Kazakhstan dated 19.01.12 № 111 "On approval of Standard rules for admission to study in educational organizations implementing educational programs of higher education" with amendments and additions dated 14.07.16 № 405.

- * Resolution of the Government of the Republic of Kazakhstan dated 13.08.12 №1042 "On approval of the Concept of development of the geological industry until 2030".
- The Law on Subsurface Resources and Subsurface Use and the draft Code on Subsurface Resources and Subsurface Use.
- Code of Public Reporting on the results of geological exploration, mineral resources and Reserves of KAZRC.
- Concept of the State Program of 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. Purpose and objectives of the educational program

The purpose of the OP: Training of highly qualified specialists who are competitive and in demand on the labor market for geological and hydrogeological companies, as well as organizations of water supply and groundwater use, capable of performing the entire range of prospecting and exploration for groundwater with calculations of operational reserves, designing rational methods of groundwater exploitation, planning and conducting monitoring studies to assess the geoecological consequences of groundwater use taking into account environmental, social and economic aspects, aimed at minimizing the impact on the environment and improving public safety.

Training in this *educational programme* is aimed at training specialists in hydrogeology and geoecology, engineering geology - in the field of theoretical and applied research in the construction of engineering structures in various conditions, assessing the resources and quality of underground water, studying the processes of formation of seasonally and permafrost rocks, and solving problems of ecological geology.

Types of employment:

- production and technological infrastructure;
- organizational and managerial support.
- experimental and research activities;
- calculation and design and analytical work

Bachelor's degree in Hydrogeology and Geoecology, depending on the type of professional activity, is prepared to solve the following professional tasks:

a) production and technological activities:

- implementation of hydrogeological and geoecological, engineering and geological observations;
- use of equipment, instruments and equipment for hydrogeological and engineering-geological, геэкологический geoecological research;
- compliance with standards, norms and rules of technical operation of

hydrogeological equipment;

- ensuring compliance with the methods and techniques of field observations;
- documentation of hydrogeological and engineering-geological works;
- solving production tasks in the course of field hydrogeological and engineering-geological, геэкологических geoecological works, desk, laboratory and analytical studies;
- operation of modern field and laboratory equipment and devices;
- keeping records of work performed and evaluating its economic efficiency;
- processing, analysis and systematization of field hydrogeological and engineering-geological, geoecological information using modern methods of its automated collection, storage and processing;
- development of methodological documents in the field of hydrogeological survey, prospecting, exploration, operational work, geological and economic assessment of subsurface use objects;
- implementation of measures for the safe conduct гидрогеологических, of hydrogeological, geoecological and geotechnical engineering works and protection of personnel and the environment at all stages of production;

b) organizational and managerial:

- organization of the work of the team, site;
- planning and organization of production hydrogeological and engineering geological surveys,
- laboratory studies of ground and underground waters;
- selection of optimal solutions when planning work in extreme conditions;
- organization of interpretation of geoecological, engineering-geological and гидрогеологических и surveys;
- compliance with the basic legislation on the rational use and protection of water resources.

c) experimental and research:

- collection and systematization of scientific and technical information of domestic and international experience in relation to solving geoecological, engineering-geological and hydrogeological, geological problems;
- mathematical modeling of hydro-geological processes and engineering geological objects based on standard computer-aided design and research packages;
- planning, conducting experiments according to specified methods, mathematical processing and analysis of the results.

d) calculation and design and analytical work:

- formation of goals and objectives of the project (program) that ensure the current level of technology for conducting hydrogeological geoecological, engineering and geological works;
- collection and analysis of information source data for design;
- conducting a preliminary feasibility study of project calculations;
- implementation of projects in production and author supervision.
- implementation of technical design in the field of hydrogeological, geoecological, engineering-geological and geochemical and ecological mapping of

territories, forecasting, prospecting, exploration, development, geological-economic and environmental assessment of objects, as well as objects related to underground structures;

- preparation of hydrogeological, geoecological, engineering-geological methodological and production-technical sections of projects of activity of production divisions as a part of production collectives and independently;

Objects of professional activity of the graduate:

- earth, earth's crust, lithosphere, rocks, aeration zone, ground water, artesian water, underground water deposits;
- physical properties of rocks, filtration abilities of rocks;
- underground water, drinking water, mineral water, and industrial water.
- natural mineral resources (solid metallic, non-metallic, liquid and gaseous), methods of their prospecting and exploration,
- techniques and technologies of geological, geochemical, hydrogeological, engineering-geological, geoecological mapping and mapping,
- geoinformation systems – technologies for subsurface exploration,
- ecological functions of the lithosphere and ecological state of mining and industrial areas of subsurface use.

OP tasks:

- studying the cycle of *general education disciplines* to ensure social and humanitarian education based on the laws of socio-economic development of society, history, modern information technologies, the state language, foreign and Russian languages;

- studying the cycle of *basic disciplines* to ensure knowledge of natural science, general technical and economic disciplines as a foundation of professional education;

- the cycle of *core disciplines* is focused on the study of key theoretical aspects of geology, hydrogeology and engineering geology, search and exploration of underground waters, and rational use of natural resources;

- study of disciplines that form the knowledge and skills of planning and organizing research, designing hydro-geological and engineering-geological works;

- familiarization with the technologies and equipment of enterprises during various types of practices.

- **acquisition of skills in laboratory research, technological calculations, equipment selection and design using modern computer technologies and programs.**

3. Requirements for evaluating the learning outcomes of an educational program

The results of mastering OOP the bachelor's degree program are determined by the competencies acquired by the graduate компетенциями and his ability to apply the formed general cultural, general professional and professional competencies in accordance with the tasks of professional activity.

As a result of mastering the PLO , the graduate must have the following competencies:

a) general cultural (s):

- ability to use the basics of philosophical knowledge to form a worldview position (OK-1);
- ability to analyze the main stages and patterns of the historical development of society in order to form a civic position (OK-2);
- ability to use the basics of economic knowledge in various spheres of life (OK-3);
- ability to use the basics of legal knowledge in various spheres of life (OK-4);
- ability to communicate orally and in writing in Russian and a foreign language to solve problems of interpersonal and intercultural interaction (OK-5);
- ability to work in a team, tolerating social, ethnic, confessional and cultural differences (OK-6);
- ability to self-organize and self-educate (OK-7);
- ability to use methods and means of physical culture to ensure full-fledged social and professional activities (OK-8);
- ability to use first aid techniques, methods of protection in emergency situations (OK-9);

b) general professional competencies (GIC):

- ability to realize the social significance of their future profession, possess high motivation to perform professional activities (OPK-1);
- possession of ideas about the modern scientific picture of the world на based on knowledge of the main provisions of philosophy, basic laws and methods of natural sciences (OPK-2);
- ability to use basic knowledge of mathematics and natural sciences in professional activities наук (OPK-3);
- ability to solve standard tasks of professional activity on the basis of information and bibliographic culture with the use of information and communication technologies and taking into account the basic requirements of information security (OPK-4);
- ability to use industry-specific regulatory and legal documents in their professional activities (OPK-5).

c) professional competencies (PC):

In the field of research activities:

- ability to use knowledge in the field of geology, geophysics, geochemistry, hydrogeology and engineering geology, geology and geochemistry горючих of fossil fuels, environmental geology to solve research problems related to their use in construction and organization of water supply at the expense of underground water (PC-1);
- ability to independently obtain geological, hydrogeological, engineering

and geological information, use в научно-исследовательской деятельности the skills of field and laboratory hydrogeological, engineering and geological and environmental research in scientific research activities исследований (PC-2);

4. Passport of the educational program

4.1. General information

№	Field name	Note
1	Code and classification of the field of education	6B05 Natural Sciences Mathematics and Statistics
2	Code and classification of training	areas B052
3	Group of educational programs	Earth Science
4	Name of the educational program	Hydrogeology and geoecology
5	Brief description of the educational program	Hydrogeology— a science that studies the origin, conditions of occurrence, composition and regularities of the movement of underground vod. The interaction of groundwater with rocks, surface water, and the atmosphere is also being studied. Geoecology is an interdisciplinary scientific field that combines studies of the composition, structure, properties, processes, physical and geochemical fields of the Earth's geospheres as a habitat for humans and other organisms.
6	Purpose of the OP	Training of highly qualified specialists who are competitive and in demand on the labor market for geological and hydrogeological companies, as well as organizations of water supply and groundwater use, capable of performing the entire range of prospecting and exploration for groundwater with calculations of operational reserves, designing rational methods of groundwater exploitation, planning and conducting monitoring studies to assess the geoecological consequences of groundwater use taking into account environmental, social and economic aspects, aimed at minimizing the impact on the environment and improving public safety.
7	Type of OP	production and technological; organizational and managerial; experimental research: calculation, design and analysis
8	Level according to NRC	to the NRC 6
9	Level according to ORC	to the ORC 6
11	List of competences of the educational program:	Natural-scientific and theoretical-ideological competencies; Social-personal and civic competencies; General engineering professional competencies; Communication and IT virtual competencies;
12	Learning outcomes of the educational program:	1 Classify groundwater according to the magnitude of its eralization, chemical and gas composition, in relation to assessment of their role in the formation of the ore body, impact on operating conditions, use for technical and king water supply.

		2 Use the skills of professional installation, maintenance and operation of modern hydrogeological equipment and preparing equipment for field surveys, conducting observations, desk processing of hydrogeological information on modern computers and specialized software. 3 Develop and manage exploration projects, apply modern methods of sounding, geological survey, mapping, interpretation. 4 Demonstrate in professional activities knowledge of social and ethical values and trends in the social, political and economic development of society, as well as leadership skills and readiness to maintain partnerships, while showing intolerance to any manifestations of corruption and a strong civil position. 5 Apply knowledge to obtain geospatial information to assess the current state of the natural environment and predict its possible changes under the influence of natural factors and anthropogenic load. 6 Apply modern methods of field and laboratory research to assess the physical and mechanical properties of soils and rocks, to identify their composition and condition. 7 Analyze the results of laboratory studies of groundwater, summarize them and establish the degree of possible use of these waters for drinking and technical water supply, irrigation and other purposes. 8 Show knowledge in the module of physical, mathematical and natural sciences, engineering graphics, information and computer technologies, geographic information and graphic systems for solving hydrogeological problems. 9 Apply scientific research methods in solving problems of hydrogeology, critically use the methods of modern science in practical activities. 10 Demonstrate business communication skills in the state, Russian and foreign languages; work in interdisciplinary teams, negotiate, establish contacts, resolve conflicts, find organizational and managerial solutions and be responsible for them. 11 Analyze the impact of the mining company's activities on the geoecological situation of the territory based on the results of monitoring of groundwater and hazardous geological processes. 12 To determine and recommend the most optimal method of drilling hydrogeological wells, taking into account the parameters of the aquifer, the complex of hydrodynamic and geophysical studies. 13 Demonstrate the ability to ensure the safe functioning of technological equipment and the sanitary and hygienic operation of the enterprise as a whole, in compliance with occupational safety regulations and environmental protection regulations and compliance with environmental standards aimed at sustainable management of natural resources and minimizing negative impacts on ecosystems and communities.
13	Education form	Full-time education

14	Period of training	4 years
15	Amount of credits	240
16	Languages of instruction	Russian, Kazakh, English
17	Academic degree awarded	Bachelor of Natural Sciences
18	Developer(s) and authors	Absametov M. K., Auelkhan E. S.

4.22. The relationship between the achievability of the generated learning outcomes in the educational program and academic disciplines

#	Name of the discipline	Short description of the discipline	Number of credits	Generated learning outcomes (codes)								
				RO1	RO2	RO3	RO4	RO5	RO6	RO7		
Cycle of general education subjects												
A mandatory component												
	LNG 108 Foreign Language	Provides students with the opportunity to gain sufficient knowledge to become more fluent in everyday social and academic settings. Students are working to improve pronunciation, expand vocabulary and grammar. Development of academic language skills.	5			/						
	LNG 104 Kazakh (Russian) language	The language material of the course is selected in such a way that the student, mastering the lexical and grammatical minimum, has the opportunity to get acquainted with typical communicative situations and find himself in such situations, is able to correctly assess them and choose the appropriate model (strategy) of speech behavior.	5		/							
	KFK 101-104 Physical culture	Physical culture as an academic discipline in the higher education system is designed to form a harmonious personality, capable of using various means of physical culture, sports and tourism to preserve and strengthen health, psychophysical training and self-training for various types .	2				/					
	CSE 677 Information and Communication Technologies	The course contains a training program aimed at leveling students ' basic knowledge in the field of information and communication technologies. It contains a full range of topics with a predominance of education of practical skills in working with data, algorithmization and programming.	5		/							
	HUM 100 Modern History of Kazakhstan	The purpose of the course is to introduce students of technical specialties to the main theoretical and practical achievements of domestic historical science on the problems of the history of modern Kazakhstan, a comprehensive and systematic study of the main stages of formation and development of Kazakhstan's society.	5	/								
	HUM 132 Philosophy	"Philosophy" is the formation of a holistic worldview that has developed in the context of the socio-historical and cultural development of mankind. Introduction to the main	5			/						

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

		paradigms of methodology for teaching philosophy and education in the classical and post-classical traditions of philosophy. Philosophy is designed to develop stable life orientations, finding the meaning of one's being as a special form of spiritual production.										
	HUM 120 Module of socio-political knowledge (sociology, political science)	the purpose of the course is the political socialization of students of the technical university, providing the political aspect of training a highly qualified specialist based on modern world and domestic political thought.	3		/							
	HUM 134 Module of socio-political knowledge (cultural studies, psychology)	The course is intended for students of the OP "Cultural Studies" is aimed at developing a social and humanitarian worldview as a basis for modernizing public consciousness through the formation of cultural identity, the ability to analyze and evaluate cultural situations based on understanding the nature of cultural processes, the specifics of cultural objects, the role of cultural values in intercultural communication.	5			/						
Cycle of general education disciplines University component												
	Fundamentals of anti corruption culture and law	Objective: to increase the public and individual legal awareness and legal culture of students, as well as to form a system of knowledge and civic position on combating corruption as an anti-social phenomenon. Content: improvement of socio-economic relations of Kazakhstan society, psychological features of corruption behavior, formation of an anti-corruption culture, legal responsibility for corruption acts in various spheres.	5	/								
	. Fundamentals of scientific research methods	The purpose of studying the academic discipline is to develop students ' skills in research activities; to introduce students to scientific knowledge, their readiness and ability to conduct research. Content: contribute to the deepening and consolidation of students ' existing theoretical knowledge; develop practical skills in conducting scientific research, analyzing the results obtained and developing recommendations; improve methodological skills in independent work with information sources and relevant software and hardware; master the principles of sustainable development and implementation of ESG practices in Kazakhstan.										
	. Fundamentals of financial literacy	Objective: formation of financial literacy of students on the basis of building a direct link between the acquired knowledge and its practical application. Content: practical use of various tools in the field of financial management, saving and increasing savings, competent budget planning,										

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

		obtaining practical skills in calculating and paying taxes and correctly filling out tax reports, analyzing financial information and navigating financial products to choose an adequate investment strategy.										
	. Fundamentals of economics and entrepreneurship	Objective: To develop basic knowledge about economic processes and business skills. Content: The discipline is studied in order to develop skills in analyzing economic concepts, such as supply and demand, market equilibrium. It includes the basics of creating and managing a business, developing business plans, assessing risks, and making strategic decisions.	5				/					
	Ecology and life safety	Objective: formation of ecological knowledge and consciousness, obtaining theoretical and practical knowledge on modern methods of rational use of natural resources and environmental protection. Contents: study of the problems of ecology as a science, laws of functioning of natural systems and aspects of environmental safety in working conditions, environmental monitoring and management in the field of its safety, ways to solve environmental problems; life safety in the technosphere, natural and man-made emergencies.	5				/					
v Cycle of basic subjects University component												
	Well drilling Well	drilling is intended to give an idea of the role of core in geological and oil and gas field operations, the need, opportunities and ways to use the results comprehensive core research for forecasting and development of oil and gas fields. The purpose of the course is to provide basic knowledge about core selection methods during drilling (including specialized core selection: sealed and oriented); about primary documentation of core material.	5		/							
	. Geodesy with the basics of topography	The purpose of this course is to teach the necessary fundamental knowledge about the topographic map, its main properties, content, modern methods and technologies for creating and using it to solve scientific and practical problems. The discipline studies the representation on maps of elements of cartographic content: hydrographic objects, topography, vegetation and soil, communication routes and communications. During the construction process, geodesic methods are constantly checked for the correct installation of building structures in the design position.										
	. Geoinformation systems in hydrogeological and	This course will cover geoinformation systems, integration of data and technologies, features of GIS										

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

	geocological research	intellectualization and decision support systems for a wide range of hydrogeological and geocological research tasks, modeling in hydrogeology and methods of its use in solving actual hydrogeological problems.										
	. Geophysical methods of prospecting and exploration	Purpose disciplines - study of the physical and geological foundations, methods and techniques of work, processing and interpretation of the results of field and geophysical methods (electrical exploration, magnetic exploration, gravity exploration, seismic exploration, radiometry and nuclear geophysics). The course examines the physical properties of rocks and the nature of the associated physical fields.	5				/					
	. Geocological research and mapping	The aim of the discipline is to provide students with comprehensive professional competencies in the field of physical geography and landscape studies, which allow them to perform activities corresponding to the training profile. As a result of mastering the discipline, the student should know the basic concepts of geocological mapping, classification features of geocological maps, the main directions of thematic geocological mapping. Must have the skills of thematic geocological mapping in office settings.	5				/					
	. Geoecology	The purpose of mastering the discipline "Geoecology" is to get acquainted with the theoretical foundations of geoecology, to form ideas about the relationship and interdependence of geospheres and the social sphere, as well as to show the consequences of changes in geospheres under the influence of anthropogenic factors. The objectives of studying the discipline "Geoecology" are – - to introduce modern concepts of geoecology as an interdisciplinary scientific field – - to give an idea of geoecosystems as objects of geoecology study, their structure, socio-economic functions and classification.	5				/					
	v Hydrogeodynamics	The purpose of the discipline is to acquire practical skills in solutions for assessing surface and underground water resources and their water intake, hydrodynamic problems related to the problems of forecasting water reserves, designing water reduction and drainage systems, and operating water intakes of economic facilities and structures.	4		/		/					
	. Hydrogeology	Components of hydrogeology; physical properties and chemical composition of underground waters; methods of processing chemical analyses of natural waters and forms of their display; types of movement of waters and brines in the Earth's crust; water solutions in the lithosphere;	5		/							

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

		hydrogeological basins and geohydrodynamic systems; useful waters in the subsurface; hydrogeological surveys and studies; paleohydrogeology; hydrogeological conditions migration, accumulation, ecological hydrogeology.										
	. Engineering and computer graphics	Purpose: To develop students ' knowledge of drawing construction and the ability to develop graphic and text design documentation in accordance with the requirements of standards. Content: Students will study ESKD standards, graphic primitives, geometric constructions, methods and properties of orthogonal projection, Monge plots, axonometric projections, metric problems, types and features of connections, creating sketches of parts and assembly drawings, detailing, as well as creating 3D complex solid-state objects in AutoCAD.	6			/						
	. Mathematics I	Objective: to introduce students to the fundamental concepts of linear algebra, analytic geometry, and mathematical analysis. Develop the ability to solve typical and applied problems of the discipline. Contents: Elements of linear algebra, vector algebra, and analytic geometry. Introduction to analysis. Differential calculus of a function of one variable. Investigation of functions using derivatives. Functions of several variables. Partial derivatives. Extremum of a function of two variables.	5	/								
	. Mathematics II	Objective: To teach students integration methods. Teach you how to choose the right method for finding the primitive. Teach you how to apply a definite integral to solve practical problems. Contents: integral calculus of functions of one and two variables, series theory. Indefinite integrals and ways to calculate them. Definite integrals and applications of definite integrals. Improper integrals. Theory of numerical and functional series, Taylor and Maclaurin series, application of series to approximate calculations.	5		/							
	. Mineralogy and petrography	Basic concepts in mineralogy: mineral type, variety, individual, crystal, aggregate. Basic properties of a crystalline substance. Crystal structure: faces, edges, and crystal symmetry. Elements of symmetry, syngony, and simple shapes. Structure and chemical composition of minerals. Polymorphism, isomorphism. Accretions and doubles. Physical and optical properties of minerals. Petrography as a science, rocks and their classification. Methods of studying rocks. Igneous rocks: intrusive and volcanic. Their classification and characterization by formation conditions, structures, textures, and mineral	5	/								

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

		composition. Sedimentary and metamorphic rocks. Industrial applications										
	v General and historical geology	The essence and content of the discipline, its scientific and practical significance, and methods of studying geological phenomena are studied. The basics of geological time calculation, elements of mineralogy, petrography, paleontology, stratigraphy and tectonics are considered. Special attention is paid to the description of the geological activity of the atmosphere, ice, underground waters, etc.; the processes of diagenesis, metamorphism, volcanism, and earthquakes. The basics of the evolution of the organic world, the geological history and patterns of the Earth's development, the main types of tectonic movements, patterns of development of geosynclines and platforms, and stages of the geological history of the Earth's development in the Precambrian, Paleozoic, Mesozoic, and Cenozoic are considered.	5		/							
	. General Engineering Geology	Course objective: to acquire theoretical knowledge about the engineering and geological features and properties of rocks, geological and engineering and geological processes occurring in these rocks, engineering and geological conditions of various territories, the study of which is necessary in order to predict their changes during economic development.	5		/							
	. General chemistry	Objective: to develop knowledge on fundamental issues of general chemistry and skills of their application in professional activities. Summary Laws, theoretical propositions and conclusions that underlie chemical disciplines; properties and relationships of chemical elements based on the periodic law of D. I. Mendeleev and on modern concepts of the structure of matter; fundamentals of chemical thermodynamics and kinetics; processes in solutions; structure of complex compounds.	5		/							
	. Fundamentals of hydrogeology and Engineering Geology	The discipline studies the physical and mechanical properties of liquids, the laws of statics and dynamics of liquids, methods for determining the size of culverts based on hydraulic justification, the theory of calculating the movement of water through water supply structures (spillways and spillways, dams, troughs, channels), as well as the use of these laws and methods to determine the main characteristics of water supply systems. parameters of building structures and their rational form. Get an idea of the geological environment and its fundamental properties; about geological systems, their classification, structure, and	5		/							

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

		hydrogeology as the science of the underground hydrosphere.										
	Structural geology	purpose of studying the discipline is to acquire theoretical knowledge about the structural elements of the Earth's crust, the mechanisms of their formation, the deformation properties of rocks and types of deformations, the structures of the sedimentary cover, the morphology of intrusive and effusive magmatic bodies, the interaction of lithospheric plates and the formation of basic structural elements. They will learn to read and analyze geological maps, build geological sections and draw up geological maps	5			/						
	Physics	Purpose: to form ideas about the modern physical picture of the world and a scientific worldview, the ability to use knowledge of fundamental laws, theories of classical and modern physics. Contents: physical fundamentals of mechanics, fundamentals of molecular physics and thermodynamics, electricity and magnetism, vibrations and waves, optics and fundamentals of quantum physics	2					/				
Cycle of basic disciplinescomponent Elective component												
	Water supply and irrigation	Characteristics of natural water supply sources. Classification of water supply types and their characteristics. Underground water intakes. Hydrogeological calculation of underground water intakes. Filters of tubular wells. Preparation of drinking water. Organization and calculation of sanitary protection zones. Land reclamation. Methods of land irrigation. Calculation of irrigation systems. Irrigation mode. Use for irrigation of underground water.	5			/						
	. Geology and mineral resources of Kazakhstan	The purpose of the discipline is to give an idea of the geological structure of the subsurface and the development of the Earth's crust within the territory of Kazakhstan, about the mineral resources of Kazakhstan, their classification, reserves, priority and strategic types of raw materials; about the tasks of the geological survey of Kazakhstan at the present stage. The course contains information about the main types of mineral resources, their availability in the country in the future and priorities in the mineral resource complex.										
	. Geophysical research of hydrogeological wells	The purpose of the discipline is to introduce students to the theory of geophysical methods of research of hydrogeological wells, methods of field observations and interpretation, consideration of geophysical methods of										

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

		research in the well as part of a single technological cycle of geological and geophysical research. The following tasks are solved: Lithological division of well sections into water; identification of aquifers in sections, determination of their thickness and structure. Currently, for the purposes of water supply, hydrogeological and engineering-geological research, many wells are constructed annually on the territory of Kazakhstan, and their drilling is carried out in most cases without core sampling.										
	v Geocological aspects of human	activity The purpose of the discipline is to study the extraction and processing of natural resources, their renewal or reproduction; use and protection of natural environmental conditions conservation, reproduction and rational change of the geocological balance of natural systems.										
	. Hydraulics and hydrology	The purpose of the discipline is to study the laws of equilibrium and fluid motion in order to solve practical problems of engineering hydrology, to form the necessary knowledge and skills for students to solve issues of designing water management and hydraulic engineering facilities. The tasks of the discipline include: - studying the basics of hydrostatics, hydrodynamics and regularities of water movement in open streams (rivers, channels, streams); - mastering a set of methods of engineering and hydrological surveys necessary in the practice of water management and hydraulic engineering design, integrated use and protection of water resources.										
	. Hydrogeochemistry	The discipline will consider the properties and composition of water, the water-rock gas-living substance system, mass transfer in hydrogeochemical systems, formation of the composition of the main genetic types of groundwater. Hydrogeochemical zoning and geochemistry of fresh, medicinal and industrial mineral waters are described. Special attention is paid to the migration of elements, features of the processes of formation of water composition in various geological conditions, in particular ground waters of humid and arid regions and reservoir waters of terrigenous, carbonate and sulfate deposits, as well as information on hydrogeochemical zoning and hydrogeochemical zoning.										
	. Hydraulic structures	The discipline studies hydraulic structures, objects for the use of water resources. Purpose of water intake structures and hydroelectric power stations. Issues of design and construction of hydraulic structures.										

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

	. Reclamation hydrogeology	The aim of the discipline is to introduce the basics of water supply and irrigation management. Purpose of the discipline: study of hydrogeological and meliorative processes associated with irrigation. Summary of the discipline: methods and tasks of reclamation hydrogeology and land reclamation, monitoring and evaluation of the reclamation state of irrigated and drained lands, water regime of soils of the reclaimed territory and regulation of the groundwater regime.	5		/	/						
	. Meteorology and climatology	The aim of the discipline is the theoretical development of the basic physical and chemical processes in the atmosphere, the regularities of the geographical distribution of the Earth's climates. Training in the discipline is aimed at acquiring knowledge and understanding of the features of the formation of radiation and thermal regimes of the atmosphere; evaporation, condensation (sublimation) of water vapor and their products; baric field and wind; atmospheric circulation. The objectives are to lay the foundation for climate formation processes and the role of geographical factors in the formation of Earth's climates; to explain the principles of constructing various climate classifications.	5		v							
	. Fundamentals of artificial intelligence	Purpose: to introduce students to the main concepts, methods and technologies in the field of artificial intelligence: machine learning, computer vision, natural language processing, etc. Contents: general definition of artificial intelligence, intelligent agents, information search and state space research, logical agents, architecture of artificial intelligence systems, expert systems, learning based on observations, statistical training methods, probabilistic processing of linguistic information, semantic models, natural language processing systems.	5			/						
	Fundamentals of subsurface use and the Water Code	The purpose of the discipline: to gain knowledge about natural waters, their reserves and distribution, their significance and role in society, their use in the national economy, their impact on the regime and quality of anthropogenic activities, to form knowledge of integrated study and rational use of subsurface resources within the framework of the legislation in force in the Republic of Kazakhstan. Summary: on water and water management balances; organization of state water resources accounting, state water cadastre, register, water code and monitoring of water bodies of the Republic of Kazakhstan;	5			/						

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

	Search and exploration of underground waters	The course is designed to study underground water deposits based on the application of basic methods of hydrogeological research. The sections of the discipline include the study of underground water deposits of the world and Kazakhstan, their features and reserves. Basic methods for estimating groundwater resources and reserves. Justification of the layout of underground water intake, selection of promising sites. Special attention is paid to methods of processing the results of field experimental filtration works and calculating the parameters of aquifers; analysis of the hydrogeological situation on the hydrogeological map.	5						/			
	Legal regulation of intellectual property	Objective: to form a holistic view of the system of legal regulation of intellectual property, including the basic principles, mechanisms for protecting intellectual property rights and features of their implementation. Content: The discipline covers the basics of IP law, including copyright, patents, trademarks, and industrial designs. Students learn how to protect and manage intellectual property rights, as well as consider legal disputes and how to resolve them.	4			/						
	ESG Principles in an Inclusive Culture	Course Objective: This course focuses on the study of ESG principles (Environmental, Social, Governance) and their interaction with the creation of an inclusive culture in an organization. Content: Students will gain knowledge about how the implementation of ESG principles contributes to business social responsibility, sustainable development and equal opportunities for all employees, including those who may face various types of discrimination. The course will help students understand the importance of an inclusive culture for achieving long-term business goals and sustainable development of the organization.	5			/						
	Industrial water supply	The purpose of mastering the discipline "Industrial water supply" is to form deep and systematic knowledge about industrial and fire-fighting water supply systems, water treatment methods, and rational operation of water management systems of industrial enterprises. Objectives of the discipline: studying the design features of industrial water supply systems; studying the requirements of various industries for water and water treatment methods; studying the norms and rules of operation of industrial water supply systems	5			/						

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

	Regional hydrogeology The	purpose of teaching the discipline "Regional hydrogeology" is for students to study various hydrogeological conditions of the Earth, get acquainted with regional patterns of distribution and formation of various types of underground in particular hydrogeological areas of the territory of Kazakhstan and the entire globe for solving scientific and applied problems; consideration of the principles of hydrogeological mapping and general zoning. The student should learn to read and analyze hydrogeological maps and sections in order to apply the acquired knowledge in their practical activities.	5						/			
Cycle of profile disciplines University component												
	Hydrogeological research	Hydrogeological studies at sites of groundwater contamination aim to identify sources of contamination, assess the volume of pollutants, as well as the direction and speed of their distribution in underground waters. The purpose of the discipline is to master the methodology of searching for fresh water on the site, conducting drilling operations, if necessary, taking measures to remove ground water, forming water intakes, and developing measures to remove ground water into reservoirs. The obtained data allow us to study the composition and properties of ground water.	5		/							
	soil mechanics	The purpose of the course of teaching the discipline is to familiarize future specialists with the basics of engineering geology, soil mechanics, general provisions of modern methods of calculation, design and construction of foundations, foundations and underground structures.	4						/			
	Ecological hydrogeology	The purpose of the discipline is to study the ecological processes associated with the activity of underground waters, anthropogenic impact on the lithosphere, familiarization with the methodology of geoecological research, study of the ecological functions of the lithosphere, natural and artificial ecoanonomies.	6				/					
	Производственная Industrial practice I II	The purpose of educational practice (practice for obtaining primary professional skills) is to consolidate and deepen the theoretical knowledge obtained; to master the necessary skills and abilities in the chosen specialty; to expand ideas about future professional activities, to increase the student's information and communication	5		/		/					

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

		level, to teach elements of observation and communication.										
v v Cycle of profile disciplines Component Software component your choice												
	Hydrogeological research of a mineral deposit	The purpose of the discipline is to gain knowledge about water quality with chemical analysis of water samples taken from wells or mine workings. Must be able to: - select the type of research, the necessary equipment and testing mode in specific hydrogeological conditions, - predict changes in the properties of minerals as a result of changes in the hydrogeological environment. Know: - the purpose of applying various methods, assessing the properties of rocks in hydrogeological studies; - modern hydrogeological methods for studying the physical and mechanical properties of soils and minerals.	5					/				
	. Hydrogeological modeling of groundwater	The main objectives of modeling research are to predict the future state of groundwater resources, understand the consequences of future events, and understand the consequences of human activities and their impact on human activities. Research on groundwater modeling is conducted to obtain computer-generated images of real-world groundwater systems. Models make it as simple as possible to represent real water systems using mathematical expressions.	5	/								
	v GEO140 Engineering Geodynamics	An idea of engineering geodynamics as a science, its formation, development and prospects, to show the importance of knowledge from other branches of natural and other sciences in the knowledge of this discipline, the causes and patterns of manifestation and development of processes and phenomena, their mechanism and protection measures. Master the principles and regularities of engineering geodynamics, apply the main provisions of engineering and geological knowledge in practical work and in applied research of geological and engineering and geological processes and phenomena.	5		/							

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

	v MAP223 Environmental mapping	The aim of studying the discipline is to develop students' knowledge, skills and professional skills in the application of the cartographic research method in the study of the state of the environment, environmental mapping, methods for creating maps and applying them to support decision-making in environmental management and in the field of environmental policy.	5				/					
	v GEO469 Search and exploration of underground waters	The course is designed to study underground water deposits based on the application of basic methods of hydrogeological research. The sections of the discipline include the study of underground water deposits of the world and Kazakhstan, their features and reserves. Basic methods for estimating groundwater resources and reserves. Justification of the layout of underground water intake, selection of promising sites. Special attention is paid to methods of processing the results of field experimental filtration works and calculating the parameters of aquifers; analyzing the hydrogeological situation based on the hydrogeological map; determining the tasks and types of hydrogeological studies, and choosing methods for assessing operational groundwater reserves.	5			/						
	v GEO572 Geomechanics of rocks	The goal is to form knowledge about the main regularities of geomechanical processes in rock massifs. Teach students to experimentally determine the mechanical properties of rocks, model and predict geomechanical processes in rock massifs, and evaluate the state of mine workings and other elements of mineral deposit development systems. Acquire knowledge about geomechanical processes developing in rock massifs, get an idea of methods for determining the parameters of elements of mining systems that ensure safe working conditions.										
	v GEO546 Hydrogeological modeling of groundwaters	Hydrogeological modeling of groundwaters who has mastered the discipline: Must know: modern methods of creating, editing, storing and organizing spatial data; modern methods of processing and analyzing various types of spatial information; a number of software packages used for processing hydrogeodynamic and	5					/				

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

		hydrogeochemical information and modeling (Excel, Statistica, Surfer, Ansdimat, Modflow).										
	v GEO627 Mining ecology	The goal is to form a complex of knowledge about the biosphere, the place of man in it and problems related to technological civilization, about the means and methods of protecting environmental components in the extraction and processing of minerals, about ways of rational and integrated use of natural resources,	5		/							
	v GEO630 Environmental monitoring	The purpose of teaching the discipline " Environmental monitoring it provides training of specialists with knowledge of environmental problems of nature management, causes and consequences of adverse effects of sources of anthropogenic pollution, methods for identifying adverse effects, rules for accounting and assessing the state of environmental objects and environmental safety of territories and objects. In the course of studying the course, students will gain knowledge about the purpose of monitoring and its types, the system of observation and ground support methods, control and feedback, and control methods.	6		/							
	v GEO631 Methods for measuring environmental parameters GEO632 Regulatory and legal bases for environmental protection	Methods for measuring environmental parameters is the formation of students ' ideas about the concepts, principles of organization and functioning of modern monitoring systems as complex information systems that affect all complex relationships and all components of the environment; - familiarization with methods for assessing the state of natural and anthropogenic modified ecosystems, methods for assessing and predicting the levels of pollution of components of the natural environment; - acquisition of skills in assessing the state of vegetation and animals by morphometric signs of damage, as well as abiotic components of the environment by chemical, physico-chemical and biological indicators; - development of the ability to apply the acquired	6		/							

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

		knowledge to develop monitoring programs of various levels										
	v GEO638 Regional engineering geology	is a branch of engineering geology that studies the regularities of engineering and geological conditions for the construction and operation of engineering structures in the Earth's crust and on its surface. She studies: 1) patterns of manifestation on the ground of factors of engineering and geological conditions caused by the natural environment, first of all, the geological structure and geological life of the area; 2) complexes of factors of natural conditions that determine the geological conditions of construction and operation of engineering structures in a given territory; 3) engineering and geological processes and phenomena based on the experience of construction in a given territories".				/						
	v GEO415 Dynamics of underground waters	The goals and objectives of the discipline are to provide students with the fundamental foundations of special hydrogeological education, to study the physical and mathematical essence of hydrogeological processes. Tasks of studying the discipline: a) trace the history of the development of the science of groundwater movement; b) study the physical and mechanical foundations of groundwater movement in the hydrolithosphere; c) study the methodology for determining calculated hydrogeological parameters; d) study analytical research and modeling methods for solving geofiltration problems.	5			/						
	GIG108 Water supply and irrigation	Characteristics of natural water supply sources. Classification of water supply types and their characteristics. Underground water intakes. Hydrogeological calculation of underground water intakes. Filters of tubular wells. Preparation of drinking water. Organization and calculation of sanitary protection zones. Land reclamation. Methods of land irrigation. Calculation of irrigation systems. Irrigation mode. Use for irrigation of underground water.	5			/						
	v GEO539 Hydrogeological study of a mineral deposit	The purpose of studying water quality is to perform chemical analysis of water samples taken from wells or mine workings. Clarification of mining and technical conditions of the future operation of the deposit. In addition to hydrogeological studies that allow us to determine the most important mining technical condition of operation — the water content of the deposit-it is necessary to know what features of the host rocks and the most useful mineral will have to be encountered when driving exploration and preparatory mine workings in the	5			/						

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

		course of field development.										
	GE GEO633 Economic foundations of nature	management Nature management is a science that studies the processes and results of interaction between society and the natural environment using economic methods, and considers a set of interrelated problems of rational nature management.	4			/						
	GE GEO634 Fundamentals of environmental management	Objectives of mastering the discipline theoretical development of its main sections and methodically based understanding of the possibility and role of the course in solving problems in ecology and nature management. Mastering the discipline is aimed at obtaining basic concepts: product quality assessment; quality indicators; basic concepts, stages and prospects for the development of standardization; state system of standardization and certification; regulatory documents on standardization; international standardization; certification systems as a tool for ensuring environmental safety and protecting the right of citizens to environmentally safe types of work, services and goods	5			/						
	GEO635 Hydroecology	is the science of the hydrological cycle, which is closely related to hydrology and uses data obtained from hydrological studies. Such as water temperature, ice phenomena, sediment characteristics, morphometric parameters of water bodies, and others. Hydroecology often uses knowledge used in hydraulic engineering. The data is used to assess water quality and the consequences of hydraulic engineering construction.	.			v						
	Hydrogeological research of a mineral deposit	The purpose of the discipline is to gain knowledge about water quality with chemical analysis of water samples taken from wells or mine workings. Must be able to: - select the type of research, the necessary equipment and testing mode in specific hydrogeological conditions, - predict changes in the properties of minerals as a result of changes in the hydrogeological environment. Know: - the purpose of applying various methods, assessing the properties of rocks in hydrogeological studies; - modern hydrogeological methods for studying the physical and mechanical properties of soils and minerals.	5			/						

5. Curriculum of the educational program

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



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

WORKING CURRICULUM

Academic year

2025-2026 (Autumn, Spring)

Group of educational programs

B052 - "Earth Science"

Educational program

6B05204 - "Hydrogeology and geoecology"

The awarded academic degree

Bachelor of natural sciences

Form and duration of study

full time - 4 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	Lk/lab/pr Contact hours	in hours SIS (including TSES)	Form of control	Allocation of face-to-face training based on courses and semesters								Prerequisites	
									1 course		2 course		3 course		4 course			
									1 sem	2 sem	3 sem	4 sem	5 sem	6 sem	7 sem	8 sem		
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)																		
M-1. Module of language training																		
LNG108	Foreign language		GED, RC	5	150	0:0:45	105	E	5									
LNG104	Kazakh (russian) language		GED, RC	5	150	0:0:45	105	E	5									
LNG108	Foreign language		GED, RC	5	150	0:0:45	105	E		5								
LNG104	Kazakh (russian) language		GED, RC	5	150	0:0:45	105	E		5								
M-2. Module of physical training																		
KFK101	Physical culture I		GED, RC	2	60	0:0:30	30	E	2									
KFK102	Physical culture II		GED, RC	2	60	0:0:30	30	E		2								
KFK103	Physical culture III		GED, RC	2	60	0:0:30	30	E			2							
KFK104	Physical culture IV		GED, RC	2	60	0:0:30	30	E				2						
M-3. Module of information technology																		
CSE677	Information and communication technology		GED, RC	5	150	30:15:0	105	E			5							
M-4. Module of socio-cultural development																		
HUM137	History of Kazakhstan		GED, RC	5	150	15:0:30	105	GE		5								
HUM134	Module of socio-political knowledge (cultural studies, psychology)		GED, RC	5	150	30:0:15	105	E			5							
HUM132	Philosophy		GED, RC	5	150	15:0:30	105	E				5						
HUM120	Module of socio-political knowledge (sociology, political science)		GED, RC	3	90	15:0:15	60	E				3						
M-5. Module of anti-corruption culture, ecology and life safety base																		
CHE656	Ecology and life safety	1	GED, CCH	5	150	30:0:15	105	E				5						
MNG489	Fundamentals of economics and entrepreneurship	1	GED, CCH	5	150	30:0:15	105	E				5						
PET519	Fundamentals of scientific research methods	1	GED, CCH	5	150	30:0:15	105	E				5						
HUM136	Fundamentals of anti-corruption culture and law	1	GED, CCH	5	150	30:0:15	105	E				5						
MNG564	Basics of Financial Literacy	1	GED, CCH	5	150	30:0:15	105	E				5						
CYCLE OF BASIC DISCIPLINES (BD)																		
M-6. Module of physical and mathematical training																		
MAT101	Mathematics I		BD, UC	5	150	15:0:30	105	E	5									
PHY468	Physics		BD, UC	5	150	15:15:15	105	E	5									

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

MAT102	Mathematics II		BD, UC	5	150	15/0/30	105	E		5								MAT101
M-7. Module of basic training																		
GEO519	General and historical geology		BD, UC	4	120	30/15/0	75	E	4									
GEN429	Engineering and computer graphics		BD, UC	5	150	15/0/30	105	E	5									
GEO432	Structural geology		BD, UC	5	150	30/15/0	105	E		5								
AAP404	Educational field geological and hydrogeological, engineering and geological practice		BD, UC	2				R		2								
GEO155	Bases of hydrogeology and geology		BD, UC	5	150	30/15/0	105	E			5							
CHE495	Chemistry		BD, UC	5	150	15/30/0	105	E			5							
GEO692	Hydrogeology		BD, UC	6	180	30/0/30	120	E			6							
GEO414	Geodasy with the basics of topography		BD, UC	5	150	30/15/0	105	E				5						
GEO423	Mineralogy and petrography		BD, UC	5	150	30/15/0	105	E				5						
GEO582	General Engineering Geology		BD, UC	5	150	30/0/15	105	E				5						
PET406	Drilling of the wells		BD, UC	5	150	30/15/0	105	E					5					
GEO510	Hydrogeodynamics		BD, UC	5	150	30/15/0	105	E					5					
GEO586	Geocology		BD, UC	5	150	30/0/15	105	E					5					
GIG134	Geoinformation systems in hydrogeological and geocological research		BD, UC	4	120	30/0/15	75	E					4					
GEO522	Hydraulics and hydrology	1	BD, CCH	5	150	30/0/15	105	E					5					
GEO523	Regional hydrogeology	1	BD, CCH	5	150	30/0/15	105	E					5					
GEO571	Geophysical investigation of hydrogeological wells	2	BD, CCH	5	150	30/0/15	105	E					5					
GIG154	Fundamentals of subsoil use and the Water Code	2	BD, CCH	5	150	30/0/15	105	E					5					
CHE950	ESG principles in inclusive culture	2	BD, CCH	5	150	30/0/15	105	E					5					
GEO411	Geophysical methods of search and exploration		BD, UC	5	150	30/15/0	105	E						5				
GEO464	Watersupplying and field prospecting of mineral	1	BD, CCH	5	150	30/15/0	105	E						5				
GEO588	Geocological aspects of human activity	1	BD, CCH	5	150	30/0/15	105	E						5				
GEO639	Metamorphology and climatology	2	BD, CCH	4	120	30/0/15	75	E						4				
GEO637	Reclamation hydrogeology	2	BD, CCH	4	120	30/0/15	75	E						4				
GEO435	Geology and Mineral Resources of Kazakhstan	3	BD, CCH	5	150	30/15/0	105	E						5				
GEO518	Hydro geochemistry	3	BD, CCH	5	150	30/0/15	105	E						5				
GIG150	Search and prospecting of subterranean waters	1	BD, CCH	5	150	30/15/0	105	E							5			
MNG562	Legal regulation of intellectual property	1	BD, CCH	5	150	30/0/15	105	E							5			
CSE831	Fundamentals of Artificial Intelligence	1	BD, CCH	5	150	15/0/30	105	E							5			
GIG152	Geocological research and mapping		BD, UC	5	150	30/15/0	105	E								5		
GIG121	Hydraulic structures	1	BD, CCH	5	150	15/0/30	105	E								5		
GEO403	Industrial water supply	1	BD, CCH	5	150	30/15/0	105	E									5	
CYCLE OF PROFILE DISCIPLINES (PD)																		
M-8. Module of professional activity																		
AAP102	Production practice I		PD, UC	2				R				2						
GEO466	Hydrogeological studies		PD, UC	5	150	30/15/0	105	E						5				
GEO529	Ecological hydrogeology		PD, UC	4	120	30/0/15	75	E						4				
AAP183	Production practice II		PD, UC	3				R						3				
GEO511	Soil science and mechanics of the soil		PD, UC	6	180	30/15/15	120	E							6			
GIG107	Monitoring of sub-terranean waters and DGP	1	PD, CCH	5	150	30/15/0	105	E							5			
MAP627	Ecological mapping	1	PD, CCH	5	150	15/0/30	105	E							5			
GEO507	Engineering-geological researches	2	PD, CCH	5	150	30/15/0	105	E							5			
GEO546	Hydrogeological modeling of groundwater	2	PD, CCH	5	150	30/0/15	105	E							5			

НАО «КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
имени К.И. САТПАЕВА»

GEO630	Environmental monitoring	3	PD, CCH	6	180	30/15/15	120	E								6	
GEO695	Special hydrogeology	3	PD, CCH	6	180	30/0/30	120	E								6	
GEO140	Engineering geodynamics	4	PD, CCH	5	150	30/15/0	105	E								5	
GEO632	Regulatory and legal framework for environmental protection	4	PD, CCH	5	150	30/0/15	105	E								5	
GEO539	Hydrogeological study of mineral deposits	1	PD, CCH	5	150	30/0/15	105	E								5	
GEO538	Artificial replenishment of groundwater	1	PD, CCH	5	150	30/0/15	105	E								5	
GIG149	Operational investigation of underground waters	2	PD, CCH	5	150	30/0/15	105	E								5	
GIN156	Ecology and Sustainable Development	2	PD, CCH	5	150	30/0/15	105	E								5	
M-9. Module of final attestation																	
ECA103	Final examination		FA	8												8	
Additional type of training (ATT)																	
AAP500	Military training																
Total based on UNIVERSITY:										31	29	28	32	29	31	32	28
										60	60	60	60	60	60	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	51	0	5	56
BD	Cycle of basic disciplines	0	91	34	125
PD	Cycle of profile disciplines	0	20	31	51
Total for theoretical training:		51	111	70	232
FA	Final attestation				8
TOTAL:					240

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 28.01.2024

Signed:
Governing Board member - Vice-Rector for Academic Affairs

Uskenbayeva R. K.

Approved:

Vice Provost on academic development
Head of Department - Department of Educational Program Management and Academic-Methodological Work
Director - Geology and Oil-gas Business Institute named after K. Baryssov
Acting Department Chair - Hydrogeology, Engineering and Oil and Gas Geology
Representative of the Academic Committee from Employers
____Acknowledged____

Kalpeyeva Z. B.
Zharagaliyeva A. S.
Auyeldun Y. .
Akparbayev R. C.
Aburnatov M. K.



Note:

1. Module of basic training and professional activity departments themselves prescribe the names of modules and their number
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 include at the expense of credits of the department component DB, VC from the basic training module
4. The full academic load of one academic year should be 60 academic credits
5. The application of the catalog of elective subjects is the same as the Curriculum is divided into modules, with the inclusion of the Module "R&D"