**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: 6
Code and classification of training areas:
6B05 Natural Sciences, Mathematics and Statistics
Group of educational programs: 6B052 Earth Science
NRC level: 6
ORC Level: 6
Duration of training:4 y
Amount of credits: 240

**Almaty 2024**

The educational programme 7M05203-"Hydrogeology and Engineering *Geology"* was approved by the Board of Directors.
code and name of the educational programme
meeting of the Academic Council of K.I.Satpayev KazNITU.

Minutes No. 5 of " 11 " December 2024

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

Minutes No. 4 of " 27 " December 2024

Educational programme 7M05203-"Hydrogeology and engineering geology
code and name of the educational programme
Developed by the Academic Committee for the " Natural Sciences, Mathematics and Statistics" track

| Full name | Academic degree / academic title | Position | Place of work | Signature |
|---|---|---|---|---|
| **Chairman of the Academic Committee:** | | | | |
| AbsametovM. K. Absametov | Doctor of Geological and Mineralogical Technical Sciences Professor | Director | of the U. M. Akhmedsafin Institute of Hydrogeology and Geoecology LLP им.У.М.Ахмедсафина | |
| **Teaching staff:** | | | | |
| Auelkhan E. S. | Candidate of Technical Sciences | Associate Professor | Associate Professor of KazNTU named after K. I. Satpayev.. | |
| Zapparov M. R. | Candidate of Geological and Mineralogical Technical Sciences | Associate Professor | Associate Professor of KazNTU named after K. I. Satpayev.. | |
| **Employers:** | | | | |
| Kalitov D. K. | Candidate of Geological and Mineralogical Technical Sciences, Associate Professor | General Director | of Production Company "Geotherm"LLP | |
| **Students** | | | | |
| Urysbai Urysbai | Aizere 3rd year student OP 6B05204 "Hydrogeology and geoecology" | - | NAO "Kazakh National Research Technical University named after K. I. Satpayev", mobile | |

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## 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 necessityof a Hydrogeology and Geoecology training programfor 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:** The purpose of the educational program of the specialty "Hydrogeology and Geoecology" is to train highly qualified, competitive and in-demand specialists in the labor market for geological, hydrogeological and engineering-geological, geoecological, mining enterprises of the Republic of Kazakhstan, able to perform calculation and design, production and technological, organizational work at industrial enterprises of the region.

OTraining in this *educational programe* 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 researchactivities:
– calculation and design and analytical work

Bachelor's degreein 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, геэкологическихgeoecological 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, геэкологическихgeoecological 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, geoecologicalой information using modern methods of its automated collection, storage and processing;

– development of methodological documents in the field of hydro-geologicalsurvey, 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 andгидрогеhydrogeological изsurveys;

- compliance with the basic legislation on the rational useнию 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 engineeringgeological 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 naturalscience, general technical and economic disciplines asa 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 organization programs

The results of mastering ООП 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 spheresof 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 воспринимая 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);

- ability в составе научно-исследовательского to participate in the участвовать в interpretation of geological, hydrogeological, engineering and geological information, preparation of reports, abstracts, bibliographies on the subject of scientific research, and preparation of publications as part of a research team (PC-3);

In the field of research and production activities:

- readiness to apply in practice basic general professional knowledge and skills of field geological, geophysical, geochemical, hydrogeological, oil and gas and environmental-geological works in solving production tasks related to the construction and operation of buildings and structures, organization and operation of water supply systems (PC-4);

- readiness to work on modern field and laboratory geological, geophysical, geochemical, hydrogeological, engineering and geological instruments, installations and equipment (PC-5);

- readiness of the research and production team to participate in the preparation of maps, diagrams, sections, and other established reports in accordance with approved forms (PC-6).

# 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 | The purpose of the OP | is to train highly qualified, competitive and in-demand specialists in the labor market for geological, hydrogeological and engineering-geological, geoecological, mining enterprises of the Republic of Kazakhstan, who are able to perform calculation and design, production and technological, organizational work at |

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| | | industrial enterprises of the region. |
| 7 | Type of OP | production and technological;<br>organizational and managerial;<br>experimental research:<br>calculation, design and analysis |
| 8 | Level according | to the NRC 6 |
| 9 | Level according | to the ORC 6 |
| 10 | Distinctive features of the OP | The most important feature of the object of hydrogeology research is the extreme variety of types of underground water use. underground water is the most precious лезноеmineral resource", and the possibilities of using this mineral resource are also extremely wide: the use of fresh underground water for drinking, domestic and other water supply , mineral (medicinal) waters, mineral industrial waters — for obtaining a number of chemicals, thermal waters - for generating electricity and heating |
| 11 | List of competencies of the educational program: | Natural-scientific and theoretical-ideological competencies;<br>Social-personal and civic competencies;<br>General engineering professional competencies;<br>Communication and IT virtual competencies; |
| 12 | Educational program results: | 7 |
| 13 | Form of training | Full-time education |
| 14 | Duration of study | 4 years |
| 15 | Volume of credits | 240 |

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| 16 | Languages of study | 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) | | | | | | | | |
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| | | | | RO1 | RO2 | RO3 | RO4 | RO5 | RO6 | RO7 | ..... | ..... |
| **Cycle of general education subjects<br>A mandatory component** | | | | | | | | | | | | |
| | of LNG 108 Foreign Language | is to provide students with the opportunity to gain sufficient knowledge to become more fluent in everyday social and academic settings. Students work to improve pronunciation, expand vocabulary and grammar. Development of academic language skills. | 5 | | | / | | | | | | |
| | v 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 | | / | | | | | | | |
| | v KFK 101-104 Physical culture | Physical culture as an academic disciplinein the higher education system is designed to form a harmonious personality, capable of using various meansof physical culture, sports and tourism to preserve and strengthen health, psychophysical training and self-training for various types . | 2 | | | | | / | | | | |
| | v 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 | | / | | | | | | | |
| | v 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 | / | | | | | | | | |

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| | v 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 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. | 5 | | | / | | | | | | |
| | v 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 | | / | | | | | | | |
| | v 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 | | | / | | | | | | |
| **v Cycle of general education disciplines<br>University component** | | | | | | | | | | | | |
| | HUM 133 Fundamentals of anti-corruption culture | Study of the basics of anti-corruption culture, system, methods, principles of forming the basics of anti-corruption culture. Methods of combating corruption in the Republic of Kazakhstan and in world practice. Formation of a patriot and citizen capable of living in a new democratic society; political, legal and anti-corruption culture of the individual Increased level of formation of Kazakhstan's patriotism, civic consciousness, legal and anti-corruption culture, tolerance and socially significant personality traits among students. | 5 | / | | | | | | | | |
| | M MNG 488 Fundamentals of entrepreneurship and leadership | The course "Fundamentals of Entrepreneurship and Leadership" contains sections on leadership, organization of business activities, financial accounting | 5 | | | | / | | | | | |
| | v CHE 656 Ecology and life safety | The main The main goal of the courseis to form concepts, principles and laws of environmental protection and life safety, and ideas about the inseparable unity of professional activity. activities with the requirements of human and environmental safety and security. | 5 | | | | | / | | | | |
| **v Cycle of basic subjects<br>University component** | | | | | | | | | | | | |
| | MAT 101-102 Mathematics I,II University component | The main goal of the course is to provide a future specialist with a certain amount of knowledge on the | 5 | | / | | | | | | | |

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| | | sections of the course "Mathematics-I.II", necessary for studying related engineering disciplines. Introduce students to the ideas and concepts of mathematical analysis. The main attention should be paid to the formation of basic knowledge and skills with a high degree of understanding of differential and integral calculus. | | | | | | | | | | |
| | v PHY 111 Physics I | The main purpose of teaching the course Physics I and Physics II is to form ideas about the modern physical picture of the world and science | 5 | | | | / | | | | | |
| | v MAT 102 Mathematics II | The purpose of teaching the course "Mathematics II" is to form bachelor's ideas about modern mathematics as a whole as a logically coherent system of theoretical knowledge. | 5 | | | | / | | | | | |
| | G GEN 429 Engineering and computer graphics | The study of ways to obtain certain graphical models of space based on orthogonal projection and the ability to solve problems related to spatial forms and relations on these models. Mastering the basic principles and methods of geometric modeling and the methodology for developing graphical applications. Mastering the knowledge of drawing construction, the ability to read and compose graphic and textual design documentation in accordance with the requirements of regulatory documents and state standards. | 5 | | | | | / | | | | |
| | v GEO431 General and historical Geology | The aim of the course is to introduce students to the theoretical foundations of the history and regularities of the development of the Earth's crust, starting from the earliest stages to the modern era. Application of basic methods for determining the age, formation conditions, and sequence of rock stratification. As a result of studying cu | 4 | | / | | | / | | | | |
| | v v GEO432 Structural geology | The aim of this discipline is to provide students with practical skills in reading geological maps, constructing geological sections, stratigraphic columns, and geological maps, as well as a qualitative description of the geological structure of an area based on a geological map and the history of geological development. | 5 | | / | | | | | | | |
| | v GEO196 Crystallography and mineralogy | Students gain knowledge on the basic theoretical and applied issues of crystallography and mineralogy, which is a fundamental geological discipline that underlies the study of rocks, ore and non-metallic minerals, processes occurring in the Earth's crust, as well as in cosmic bodies | 6 | | | | / | | | | | |
| | v GEO434 Petrography | The purpose of the course: comprehensive knowledge of the composition of the earth's surface. structure, structure and texture, classification of igneous, sedimentary, | 5 | / | | | | | | | | |

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| | | metamorphic, and metasomatic rocks, nomenclature and conditions of rock formation and the relationship of mineral deposits with them. | | | | | | | | | | |
| | v CHE495 General Chemistry | The aim of studying the discipline is to provide students with fundamental training in chemistry, which helps prepare students for interdisciplinary experimental and research activities aimed at creating competitive products based on the use of modern design methods and tools, mathematical, physical and computer modeling of technological processes. | 5 | | | / | | | | | | |
| | v GEO414 Geodesy with | the basics of topographystudies the basics of knowledge about methods, techniques and organization of work related to the study of the earth's surface and its display on plans and maps, as well as gives an idea of other types of measurements. | 5 | | / | | | | | | | |
| | v GEO411 Geophysical methods of prospecting and exploration | Course objective: Geophysical methods of prospecting and exploration are widely used in solving problems of geological mapping, prospecting and exploration of deposits of ores, nonmetallic raw materials and hydrocarbons | 5 | | | / | | | | | | |
| | v RET406 Drilling wells | Drilling wells is the process of drilling a well in the ground to extract natural resources such as ground water, brine, natural gas, or oil, to pump fluids from the surface into an underground formation, or to evaluate underground formations or monitor them. | 5 | | / | | | | | | | |
| | v GEO439 Sedimentology | The course "Sedimentology" gives an idea of the subject of science, goals, tasks, place among other geological sciences. The discipline presents information about precipitation, its elemental, chemical, mineral and component | 5 | | | | / | | | | | |
| | v GEO510 | Hydrogeodynamics Acquisition of practical skills in solutions for assessing surface and underground water resources and their water intake, hydrodynamic problems related to the problems of forecasting water resources, designing water reduction and drainage systems, operating water intakes of economic facilities and structures. | 5 | | / | | | | | | | |
| | **vGEO58 2 General Engineering Geology** | a scientific fieldof engineering geologythat studies regional patterns of development of the upper horizonsof the Earth's crust(lithosphere) and their interaction with engineering structures in connection with the implemented, current or planned engineering and economic activities, primarily engineering and construction, | 5 | | | / | | | | | | |
| | **v AAP179**Educational practice | is designed to gain experience in primary professional activity. 2 v Cycle of basic disciplines Elective | 2 | | | | | | / | | | |

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| **Cycle of basic disciplinescomponent Elective component** | | | | | | | | | | | | |
| | GEO508 General 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 water movement and movement of natural waters and other natural resources. brines in the earth's crust; water solutions in the lithosphere; hydrogeological basins and geohydrodynamic systems; mineral waters in the subsurface; hydrogeological surveys and studies; paleohydrogeology; hydrogeological conditions of migration, accumulation, ecological hydrogeology. | 5 | | | / | | | | | | |
| | v GEO509 General Engineering Geology | Course objective: to acquire theoretical knowledge about the engineering and geological features and properties of rocks, the geological and engineering and geological processes occurring in these rocks, the engineering and geological conditions of various territories, the study of which is necessary in order to predict their changes during economic development. | 5 | | / | | / | | | | | |
| | **v** v GEO160 Operational exploration of underground waters | Operational exploration of underground waters solves problems by organizing and conducting comprehensive studies on the study of the underground water regime at all large water intake structures, as well as conducting special studies in small volumes to justify the artificial reproduction of operational reserves of underground water. | 5 | | **v** | | | | | | | |
| | **GEO523** REGIONAL ГНYDROGEOLOGY | Regional hydrogeology is a branchof hydrogeology, that studiespatternsраспространения подземных of groundwater distributionandhydrogeologicalconditionsin regions, districts,and individualcountries. The resultsof regionalhydrogeologicalstudiesare expressedinhydrogeologicalmaps,profilesanddescriptions | 5 | | | | / | | | | | |
| | v GEO435 Geology and mineral resources of Kazakhstan | The purpose of studying this discipline is to familiarize students with the main features of the geological structure of the subsurface of Kazakhstan, their study, the principles of tectonic zoning of the territory of this region, the main tectonic structures of the Earth's crust, their stratigraphy and magmatic complexes, regularities of geological development and placement of mineral deposits in them. An idea of Kazakhstan's mineral resources, their classification, reserves, priority and strategic types of raw materials is given. Tasks of the Geological Survey of Kazakhstan at the present stage. | 5 | | | / | | | | | | |

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| | v GEO588 Geoecological aspects of human | activity Nature management includes extraction and processing of natural resources, their renewal or reproduction; use and protection of natural environmental conditions; preservation, reproduction and rational change of the geoecological balance of natural systems. *Nature management is* understood as the totality of all forms of exploitation of natural resourcepotential and measures for its conservation | 5 | | | | | | / | | | |
| | GE GEO589 Mining and environmental protection | The problem of subsurface protection is intertwined with the tasks of rational use of mineral resources in the development of mineral deposits. The solution to this problem is to improve the technology of extraction and processing of all mineral products, ensuring their full, expedient and environmentally correct use. Problems of rational use of mineral resources and environmental protection can be effectively solved by taking into account the classification of environmental requirements for the exploration and development of mineral deposits, depending on the geographical location of the deposit, population density, the degree of land use, climatic conditions, the volume of development, and the value of the mineral. | 4 | | | / | | | | | | |
| | v GEO590 Ecology | The aim of the discipline "Ecology" is to form students 'ideas about the unity of the ecosphere as an integral system; to get acquainted with the ecological and socio-economic consequences of changes in geospheres under the influence of natural and anthropogenic factors; to form students' understanding of the role, place and significance of the ecosphere in general and its local and regional features for life and a person. | 5 | | | | / | | | | | |
| | v GEO586 Geoecology | is an interdisciplinary science about the ecological problems of geospheres, the object of which is geospheric ecosystems. shells of the Earth, and the subject – all knowledge about them, including changes under the influence of natural and man-made factors. The main task of geoecology is to study changes in the life-supporting resources of geosphere shells under the influence of natural and anthropogenic factors, their protection, rational use and control in order to preserve a productive natural environment for present and future generations of people. | 5 | | | / | | | | | | |

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| | GE<br>GEO522 Hydraulics and hydrology | The aim is to study the physical properties and movement of liquids, general equilibrium laws, hydraulic resistance, fluid movement through pipes and their outflow from holes, and modeling hydrodynamic phenomena. Students gain in-depth theoretical knowledge of the basics of performing hydrological works using modern measuring instruments and hydrometric equipment, set up water measurement and hydrological posts, organize flow accounting and control on rivers and watercourses, use the laws of water flow hydraulics in hydrometry and hydrology. | 5 | | | | | | / | | | |
| **Цикл Cycle of profile disciplines University component** | | | | | | | | | | | | |
| | **GEO466<br>Hydrogeological research** | Hydrogeological research includes: search for fresh water on the site, drilling operations, if necessary, measures for the removal of ground water, the formation of water intake, the development of measures for the removal of ground water into reservoirs. The obtained data allow us to study the composition and properties of ground water, and also make it possible to drill a well correctly. Potential risks of building operation arise if hydrogeological surveys are neglected. As a rule, the destruction of the foundation occurs precisely due to the negative properties of soils. | 5 | | / | | | | | | | |
| | **v<br>GEO529 Ecological hydrogeology** | Ecological hydrogeology. Ecologicalprocesses related to the activity of underground waters. Anthropogenic impact on the lithosphere. Methodology of geoecological research. T. Malthus ' Law. Thermal boundary. Ecology of the geological environment. Ecological functions of the lithosphere. Natural and artificial eco-anomalies. Geodynamic function of the lithosphere. Ecological geology. The doctrine of the composition of the Earth. The doctrine of the evolution of the Earth. | 4 | | | | | | / | | | |
| | v GEO511 Soil science and soil mechanics | The purpose of mastering the discipline " Soil science and soil mechanics "is to form future specialists' ideas about rocks as soils, their behavior in the economic development of any territories and man-made impact on the environment | 6 | | | | / | | | | | |
| | v Production practice I II | The purpose of training practice (practice for obtaining primary professional skills) - consolidation and deepening | 5 | | / | | / | | | | | |

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| | | of the acquired theoretical knowledge; mastering the necessary skills and abilities in the chosen specialty; expanding ideas about future professional activities, improving информационнокоммуникативногоthe student's information and communication level, training in the elements of observation and communication. | | | | | | | | | | |
| **v v Cycle of profile disciplines Component Software component your choice** | | | | | | | | | | | | |
| | **GEO534 GEO534 Geophysical methods in hydrogeology and engineering geology** | Discusses the physical properties of rocks and the nature of the associated physical fields. The principles of operation and design of geophysical equipment, techniques for performing field measurements and processing the obtained data are described, and the scope of application is indicated. | 5 | | | | | / | | | | |
| | **v GEO639 Metereology and climatology** | The aim of mastering 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. Mastering the discipline is aimed at acquiring knowledge and understanding of the features of the formation of radiation and thermal regimes of the atmosphere; processes of evaporation, condensation (sublimation) of water vapor and their products; baric field and wind; atmospheric circulation. To lay the foundations of 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 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 | | / | | | | | | | |

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| | **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 systems. processes developing in rock massifs, get an idea of methods for determining the parameters of elements of development systems that ensure safe working conditions. | 5 | | | | | | / | | | |
| | **v GEO546 Hydrogeological modeling of underground waters** | Hydrogeological modeling of underground waters developed discipline:<br>Must know:<br>modern methods of creating, editing, storing and organizing spatial data;<br>modern methods of processing and analyzing various types of spatial information; a number of software packages used for processing hydrogeodynamic and | 5 | | / | | | | | | | |

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| | | 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, | 6 | | / | | | | | | | |
| | **v GEO630 Environmental monitoring** | The purpose of teaching the discipline "Environmental monitoring яв-ляетсяit provides training of specialists with knowledge of environmental problems of naturemanagement, causes and consequences of adverse effects of-sources of anthropogenic pollution, methods выяв-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;<br>- 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;<br>- 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;<br>- development of the ability to apply the acquired | | | | | / | | | | | |

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| | | 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". | 5 | | | / | | | | | | |
| | **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 thehydrolithosphere; c) study the methodology for determining calculated hydrogeological parameters; d) study analytical research and modeling methods for solving geofiltration problems. | 5 | | | | | / | | | | |
| | **GIG 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 for the future operation of the field. 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 course | 4 | | | | / | | | | | |

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| | | of field development. | | | | | | | | | | |
| | **GE GEO633 Economic foundations of nature** | management Nature managementis 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 rationalnature management. | 5 | | | / | | | | | | |
| | **GE GEO634 Fundamentals of environmental management** | Objectives of mastering the discipline<br>theoretical development of its main sections and<br>methodically based understanding<br>of the possibility and role of the course in solving<br>problems in ecology and nature management. Mastering<br>the discipline is aimed at obtaining basic concepts:<br>product quality assessment; quality<br>indicators; basic concepts, stages and prospects for the<br>development of standardization;<br>state system of standardization and certification;<br>regulatory documents on<br>standardization; international standardization; certification<br>systems as a tool<br>for ensuring environmental safety and protecting the right<br>of citizens to environmentally<br>safe types of work, services and goods | . | | | | **v** | | | | | |
| | **GEO635 Hydroecology** | the science of the hydrological cycle, which is closely related to hydrology, 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. | 5 | | | / | | | | | | |

# 5. Curriculum of the educational program

## KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K. I. SATPAYEV

NJSC "KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I. SATPAEV"

SATBAYEV UNIVERSITY

APPROVED
Chairman of the Management Board-
Rector of KazNRTU named after K.Satpayev
_____ M.M. Begentaev
"04" 04 2024 y.

**CURRICULUM**
**of Educational Program on enrollment for 2024-2025 academic year**

**Educational program 6B05204 - "Hydrogeology and geoecology"**
**Group of educational programs B052 - "Earth Science"**

Form of study: full-time | Duration of study: 4 years | Academic degree: bachelor of science

| Discipline code | Name of disciplines | Cycle | Total amount in credits | Total hours | Classroom amount lec/lab/pr | SIS (including TSIS) in hours | Form of control | Allocation of face-to-face training based on courses and semesters | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | I course | | II course | | III course | | IV course | |
| | | | | | | | | 1 semester | 2 semester | 3 semester | 4 semester | 5 semester | 6 semester | 7 semester | 8 semester |
| **CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)** | | | | | | | | | | | | | | | |
| **M-1. Module of language training** | | | | | | | | | | | | | | | |
| LNG 108 | Foreign language | GED, RC | 5 | 150 | 0/0/3 | 105 | E | 5 | | | | | | | |
| LNG 108 | Foreign language | GED, RC | 5 | 150 | 0/0/3 | 105 | E | | 5 | | | | | | |
| LNG 104 | Kazakh (russian) language | GED, RC | 5 | 150 | 0/0/3 | 105 | E | 5 | | | | | | | |
| LNG 104 | Kazakh (russian) language | GED, RC | 5 | 150 | 0/0/3 | 105 | E | | 5 | | | | | | |
| **M-2. Module of physical training** | | | | | | | | | | | | | | | |
| KFK 101-106 | Physical Culture | GED, RC | 8 | 240 | 0/0/8 | 120 | Difzach | 2 | 2 | 2 | 2 | | | | |
| **M-3. Module of information technology** | | | | | | | | | | | | | | | |
| CSE 677 | Information and communication technologies (in English) | GED, RC | 5 | 150 | 2/1/0 | 105 | E | | | | 5 | | | | |
| **M-4. Module of socio-cultural development** | | | | | | | | | | | | | | | |
| HUM 137 | History of Kazakhstan | GED, RC | 5 | 150 | 1/0/2 | 105 | SE | | 5 | | | | | | |
| HUM 132 | Philosophy | GED, RC | 5 | 150 | 1/0/2 | 105 | E | | | | 5 | | | | |
| HUM 120 | Socio-political knowledge module (sociology, politology) | GED, RC | 3 | 90 | 1/0/1 | 60 | E | | | | 3 | | | | |
| HUM 134 | Socio-political knowledge module (culturology, psychology) | | 5 | 150 | 2/0/1 | 150 | E | | | 5 | | | | | |
| **M-5. Module of anti-corruption culture, ecology and life safety base** | | | | | | | | | | | | | | | |
| HUM 156 | Fundamentals of anti-corruption culture | GED, CCH | 5 | 150 | 2/0/1 | 150 | E | | | | 5 | | | | |
| MNG 488 | Fundamentals of Entrepreneurship and Leadership | | | | | | | | | | | | | | |
| PET319 | Fundamentals of Scientific research methods | | | | | | | | | | | | | | |
| MNG584 | Basics of Financial Literacy | | | | | | | | | | | | | | |
| CHE 656 | Ecology and life safety | | | | | | | | | | | | | | |
| **CYCLE OF BASIC DISCIPLINES (BD)** | | | | | | | | | | | | | | | |
| **M-6. Module of physical and mathematical training** | | | | | | | | | | | | | | | |
| MAT 101 | Mathematics I | BD, UC | 5 | 150 | 1/0/2 | 105 | E | 5 | | | | | | | |
| PHY 408 | Physics | BD, UC | 5 | 150 | 1/1/1 | 105 | E | 5 | | | | | | | |
| MAT 102 | Mathematics II | BD, UC | 5 | 150 | 1/0/2 | 105 | E | | 5 | | | | | | |
| **M-7. Module of basic training** | | | | | | | | | | | | | | | |
| GEO155 | Basics of hydrogeology and geology | BD, UC | 5 | 150 | 2/1/0* | 105 | E | | 5 | | | | | | |
| GEO519 | General and historical geology | BD, UC | 4 | 120 | 2/1/0* | 75 | E | 4 | | | | | | | |
| GIN148 | Geology of sedimentary basin structures | BD, UC | 5 | 150 | 2/0/1* | 105 | E | | 5 | | | | | | |
| GEO692 | Hydrogeology | BD, UC | 6 | 180 | 2/0/2* | 120 | E | | | 6 | | | | | |
| GIN423 | Mineralogy and petrography | BD, UC | 5 | 150 | 2/1/0* | 105 | E | | | | 5 | | | | |
| CHE495 | General chemistry | BD, UC | 5 | 150 | 1/1/1* | 105 | E | | | 5 | | | | | |
| GEN429 | Engineering and computer graphics | BD, CCH | 5 | 150 | 1/0/2 | 105 | E | | | 5 | | | | | |
| GEO414 | Geodesy with the basics of topography | BD, UC | 5 | 150 | 2/1/0* | 105 | E | | | | 5 | | | | |
| GIG134 | Geoinformation systems in hydrogeological and geoecological research | BD, UC | 5 | 150 | 2/1/0* | 105 | E | | | | | 4 | | | |
| GEO387 | General Engineering Geology | BD, UC | 5 | 150 | 2/1/0* | 105 | E | | | | 5 | | | | |
| GEO523 | Regional hydrogeology | BD, CCH | 5 | 150 | 2/1/0* | 105 | E | | | | | 5 | | | |
| GEO522 | Hydraulics and hydrology | | | | | | | | | | | | | | |
| PET406 | Drilling Wells | BD, UC | 5 | 150 | 2/1/0* | 105 | E | | | | | 5 | | | |
| GEO486 | Geocology | BD, UC | 5 | 150 | 2/1/0* | 105 | E | | | | | 5 | | | |
| GIG152 | Geoecological research and mapping | BD, UC | 4 | 120 | 2/1/0* | 75 | E | | | | | | | | 5 |
| GEO510 | Hydrogeodynamics | BD, UC | 5 | 150 | 2/1/0* | 105 | E | | | | | 5 | | | |
| MNG363 | Fundamentals of sustainable development and ESG projects in Kazakhstan | BD, CCH | 5 | 150 | 2/0/1* | 105 | E | | | | | 5 | | | |
| GEO571 | Geophysical investigation of hydrogeological wells | | | | | | | | | | | | | | |
| GIG154 | Fundamentals of subsoil use and the Water Code | | | | | | | | | | | | | | |
| GEO464 | Watersupplying and field prospecting of mineral | BD, CCH | 5 | 150 | 2/1/0* | 105 | E | | | | | | 5 | | |
| GEO588 | Geoecological aspects of human activity | | | | 2/0/1* | | | | | | | | | | |
| GEO639 | Meteorology and climatology | BD, CCH | 4 | 120 | 2/0/1* | 75 | E | | | | | | 4 | | |
| GEO637 | Reclamation hydrogeology | | | | | | | | | | | | | | |
| GEO435 | Geology and Mineral Resources of Kazakhstan | BD, CCH | 5 | 150 | 2/1/0* | 105 | E | | | | | | 5 | | |
| GEO518 | Hydro geochemistry | | | | 2/0/1* | | | | | | | | | | |
| GIG150 | Search and prospecting of subterranean waters | BD, CCH | 5 | 150 | 2/1/0* | 105 | E | | | | | | | 5 | |
| CSE831 | Fundamentals of Artificial Intelligence | | | | 1/0/2* | | | | | | | | | | |

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| MNG562 | Legal regulation of intellectual property | | | | 2/0/1* | | | | | | | | | | | |
| GIG121 | Hydraulic structures | BD, CCH | 5 | 150 | 1/0/2* | 105 | E | | | | | | | | | 5 |
| GEO403 | Industrial water supply | | | | 2/1/0* | | | | | | | | | | | |
| GED411 | Geophysical methods of search and exploration | BD, UC | 5 | 150 | 2/1/0* | 105 | E | | | | | | | 5 | | |
| AAP404 | Educational field geological,hydrogeological and engineering geological practice | BD, UC | 2 | | | | | | 2 | | | | | | | |
| **CYCLE OF PROFILE DISCIPLINES (PD)** | | | | | | | | | | | | | | | | |
| **M-8. Module of professional activity** | | | | | | | | | | | | | | | | |
| GED511 | Soil science and mechanics of the soil | PD, UC | 6 | 180 | 2/1/1* | 120 | E | | | | | | | 6 | | |
| GEO406 | Hydrogeological studies | PD, UC | 5 | 150 | 2/1/0* | 105 | E | | | | | | 5 | | | |
| GEO529 | Ecological hydrogeology | PD, UC | 4 | 120 | 2/1/0* | 75 | E | | | | | | 4 | | | |
| GIG107 | Monitoring of sub-terranean waters and DGP | PD, CCH | 5 | 150 | 2/1/0* | 105 | E | | | | | | | 5 | | |
| MAP223 | Ecological mapping | | | | 2/0/1* | | | | | | | | | | | |
| GEO567 | Engineering-geological researches | PD, CCH | 5 | 150 | 2/1/0* | 105 | E | | | | | | | 5 | | |
| GED546 | Hydrogeological modeling of groundwater | | | | 2/0/1* | | | | | | | | | | | |
| GEO630 | Environmental monitoring | PD, CCH | 6 | 180 | 2/1/1* | 120 | E | | | | | | | 6 | | |
| GED695 | Special hydrogeology | | | | 2/0/2* | | | | | | | | | | | |
| GEO140 | Engineering geodynamics | | | | | | | | | | | | | | | |
| GEO632 | Regulatory and legal framework for environmental protection | PD, CCH | 5 | 150 | 2/0/1* | 105 | E | | | | | | | 5 | | |
| GEO539 | Hydrogeological study of mineral deposits | PD, CCH | 5 | 150 | 2/0/1* | 105 | E | | | | | | | | | 5 |
| GEO538 | Artificial replenishment of groundwater | | | | | | | | | | | | | | | |
| GIG149 | Operational investigation of underground waters | PD, CCH | 5 | 150 | 2/0/1* | 105 | E | | | | | | | | | 5 |
| GEO634 | Fundamentals of environmental management | | | | | | | | | | | | | | | |
| AAP102 | Production Practice I | PD, UC | 2 | | | | | | | | 2 | | | | | |
| AAP185 | Industrial internship II | PD, UC | 3 | | | | | | | | | | 3 | | | |
| **M-9, Module of final attestation** | | | | | | | | | | | | | | | | |
| EGA108 | Writing and defense of the thesis / project | FA | 8 | | | | | | | | | | | | | 8 |
| **M-10. Module of additional types of training** | | | | | | | | | | | | | | | | |
| AAP300 | Military affairs | ATT | 0 | | | | | | | | | | | | | |
| **Total based on UNIVERSITY:** | | | | | | | | 26 | 34 | 23 | 37 | 29 | 31 | 32 | 28 | |
| | | | | | | | | 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 | 56 | | | 56 |
| BD | Cycle of basic disciplines | | 96 | 29 | 176 |
| PD | Cycle of profile disciplines | | | | |
| | *Total for theoretical training:* | 56 | | | *212* |
| FA | final attestation | 8 | | | 8 |
| | TOTAL: | 64 | 0 | 0 | 140 |

Decision of the Academic Council of Kazatu named after K.Satpayev. Protocol № 12 «12» 04 2024 y.

Decision of the Educational and Methodological Council of Kazatu named after K.Satpayev. Protocol № 6 «19» 04 2024 y.

Decision of the Academic Council of the Institute GaPE. Protocol № 12 «08» 04 2024 y.

Board Member - Vice-Rector for Academic Affairs — R.K. Ukimbayeva

Director of Geology and Petroleum Engineering Institute named after K. Turysov — A.H. Syadykov

Head of the Department of "Hydrogeology, engineering and petroleum geology" — Y.S. Auyelkhan

Specialty Council representative from employers — M.K. Abuametov