



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

EDUCATION PROGRAM
8D05202 - "Hydrogeology and engineering geology"
Code and name of the educational program

Educational field code and classification: 8D05 Natural sciences, mathematics and statistics

Code and classification of training areas: 8D052 Environment

Group of educational programs: D088- Hydrogeology and engineering geology

Level of the National Curriculum: 8

Level of the SBS: 8

Duration of study: 3 years
credits : 180

Almaty 2025

Educational program 8 D 052 02 - " Hydrogeology" and engineering degree geology
» approved for

educational program code and name

Meeting of the Academic Council of the KazNTU named after K.I. Satpayev

No. 10 Protocol " 06" 03.2025 years.

It was considered and recommended for approval at a meeting of the Academic and Methodological Council of the KazNTU named after K.I. Satbayeva.

No. 3 Protocol "20" 12.2025 years.

Educational program 8D05202 - " Hydrogeology" and engineering geology

Code and name of the educational program

Developed by the academic committee in the field of "Environmental Protection".

T.A.A.	Academic degree/ scientific title	Position	Workplace	Hand
Chairman of the Academic Committee:				
Absametov Malis Kudysovich	Doctor of Geological Sciences	Director	"K.I.Satpayev Kazakh National Technical Research University" NJSC, mobile phone: +77078290161, igg.info@ail.ru	
Faculty:				
Auelkhan Yergali Satyshuly	Candidate of Technical Sciences	Associate Professor	"K.I. Satbayev Kazakh National Technical Research University" NJSC, mobile phone: +77078290161, y.auyelkhan@satbayev.university	
Zapparov Medekhan Rasilkhanovich	Candidate of Geological and Mineralogical Sciences	Associate Professor	"Kazakh National Technical Research University named after K.I.Satpayev" NJSC, mobile phone: +7 777 297 08 98, m.zapparov@satbayev.university	
Ensepbayev Talgat Ablaevich	Candidate of Geological and Mineralogy Sciences	Professor	"K.I. Satpayev Kazakh National Technical Research University" NJSC, mobile phone: +7 777 693 22 44, t.yensepbayev@satbayev.university	

Uzbekgaliev Rizakhan Halelovich	Candidate of Geological and Mineralogy Sciences	Senior lecturer	"K.I. Satbayev Kazakh National Technical Research University" NJSC, mobile phone: +7 701 733 33 01, r.uzbekgaliyev@satbay ev.university	
Smabaeva Raigul Kulbekovna	Doctor of Philosophy (PhD).	Senior lecturer	"K.I. Satbayev Kazakh National Technical Research University" NJSC, mobile phone: +77077045446, r.smabayeva@satbayev. university	
Omirezakova Elmira Zhenisovna	Candidate of Geological and Mineralogy Sciences	Senior lecturer	Kazakh National Technical Research University named after K.I. Satbayev, mobile phone: +77772808560, e.omirezakova@satbaye v.university	
Employers:				
Absametov Malis Kudysovich	Doctor of Geological Sciences	Director	"K.I.Satpayev Kazakh National Technical Research University" NJSC, mobile phone: +77078290161, igg.info@ail.ru	
Students				
Nurgalimova Zhansaya Sabyrovna	-	Doctoral student, 2nd year OP 8D05202 Hydrogeology and engineering geology	"Kazakh National Technical Research University named after K.I.Satpayev" JSC K E mobile phone: +77472091286, makhitova73@mail.ru	

Contents

List of abbreviations and symbols

1. Description of the educational program
2. The goals and objectives of the educational program
3. Requirements for assessing the learning outcomes of an educational program
4. Educational program document
- 4.1. General information
- 4.2. The relationship between the educational program and the achievement of learning outcomes formed in academic subjects
5. Educational program curriculum
6. Additional educational programs (Minor)

List of abbreviations and symbols

BP – basic subjects
MZHMBBS - state standard of compulsory education
DP – Documented Procedure
DLT – distance learning technologies
UNT – Unified National Testing
Higher education institution - individual curriculum
CTO – credit learning technology
EPC – Elective Subject Catalog
MES RK – Ministry of Education and Science of the Republic of Kazakhstan
MOP - Modular Educational Program
R&D – scientific research work
Scientific research activity - scientific research activity
Research and development work - research work of a master's student
General education subjects - general education subjects
BU – educational program
CP – profile subjects
PC – personal computer
Faculty – teaching staff
RK – Republic of Kazakhstan
CNS – working curriculum
QMS – quality management system
SRM – independent work of a master's student
SRMP – independent work under the guidance of undergraduates
teacher's
NSO – sample curriculum
ISB - teaching and support staff
POAK - educational and methodological complex of subjects
CEC - Educational and Methodological Council
OSS – educational and methodological work
ELM – electronic learning materials

1. Educational program description

a doctoral degree is determined by the amount of academic credits acquired. Mastering a set amount of academic credits and philosophy PhD in Sciences The educational program of the doctoral program is considered to be fully mastered upon achieving the expected learning outcomes for obtaining the degree of doctor . In the scientific and pedagogical doctorate , at least 120 academic credits are realized during the entire period of study, including all types of educational and scientific activities of the doctoral student .

Planning of the content of education, organization and methods of conducting the educational process is carried out independently by universities and scientific organizations based on Credit Learning Technology.

Doctoral studies in scientific and pedagogical direction Implements postgraduate educational programs for the training of scientific and scientific-pedagogical personnel for higher education institutions and scientific organizations with advanced scientific-pedagogical and research training.

of the doctoral educational program consists of the following:

- 1) theoretical training, which includes the study of cycles of basic and specialized subjects;
- 2) practical training of doctoral students : various types of internships, scientific or professional internships;
- 3) research work, including the completion of a doctoral dissertation; for scientific and pedagogical doctoral studies
- 5) final certification.

The content of the educational program "Hydrogeology and Engineering Geology" is aimed at maximally satisfying the needs of consumers based on the development of a multi-level system of personnel training, the validity and quality of training, the continuity and continuity of knowledge and science, the unity of teaching, education, research and innovative activities:

- Obtaining full-fledged and high-quality professional and scientific-pedagogical education, confirmed by the level of knowledge and skills, skills and competence in the field of geology of solid mineral deposits, and evaluating them both in content and volume ;

- To ensure the training of masters in the geological field who are familiar with the technology, organization and economics of the hydrogeological field, as well as the methods and principles of its improvement and design.

- Training professional and competitive specialists in the field of hydrogeology and engineering geology, groundwater exploration and exploration;

- a high level of theoretical training in socio-cultural, economic-legal and professional disciplines, taking into account modern scientific-pedagogical and professional trends in social development, and the involvement of leading domestic and foreign specialists in the field of hydrogeology and engineering geology in the educational process;

- high level of language preparation

- implementation of projects aimed at developing design and research skills, practical application of modern professional digital methodologies and technologies for organizing the activities of geological production enterprises, research and educational organizations;
- optimal ratio of theoretical and practical training in the educational process (due to the purposeful organization of scientific research and industrial practices);
- a person-oriented approach to the educational process, aimed at developing a responsible attitude to the results of one's professional activities;
 - the aspect of self-development, in which the emphasis is on the organization of professional activities, within the framework of which the master's student is aimed at constant professional self-improvement .

2. Goals and objectives of the educational program

The purpose of the educational program: To train specialists with a high level of professional culture who have a civic stance, are able to formulate and practically solve modern scientific and practical problems, form modern environmental thinking in them, have a knowledge base, master scientific research skills, master the methodology of conducting scientific research that allows teaching in higher education institutions, participate in scientific activities at various levels, and successfully carry out research and management activities in the field of hydrogeology and engineering geology.

is the training of competitive, highly qualified specialists with high spiritual and moral qualities, capable of independent thinking and ensuring the progressive scientific and technical, socio-economic and cultural development of society, taking into account the development prospects of the country.

The specialty "Hydrogeology and Engineering Geology" is conducted at the master's level according to the methods that provide for the implementation of educational programs for the training of specialists in the hydrogeological and engineering-geological directions with advanced technical- analytical , scientific-pedagogical and forecasting skills .

Labor types of services

- scientific research;
- scientific and industrial;
- project;
- organizational and managerial;
- scientific and pedagogical.

The Master's degree in "Hydrogeology and Engineering Geology" prepares students to solve the following professional tasks, depending on the type of professional activity :

a. scientific research service:

- independently select and justify the goals and objectives of scientific research;
- independently select and master methods for solving tasks when conducting field, laboratory, and interpretive research using modern equipment, instruments,

and information technologies (in accordance with the direction (profile) of the master's program);

- analyze and summarize the results of scientific and research work using modern achievements of science and technology, advanced Kazakhstani and foreign experience;

- evaluation of the results of scientific research, preparation of scientific reports, publications, presentations, applications for inventions and innovations;

p. scientific and industrial service:

- independently prepare and conduct industrial and scientific-industrial field, laboratory and interpretative research when solving practical problems (in accordance with the direction (profile) of the master's program);

- independent selection, preparation and professional use of modern field and laboratory equipment and instruments (in accordance with the direction (profile) of the master's program);

- collect, analyze and systematize available specialized information using modern information technologies;

- comprehensive processing and interpretation of field and laboratory information in order to solve scientific and industrial tasks;

- determining the economic efficiency of scientific and industrial work;

sh. project service:

- design and implementation of scientific and technical projects;

- participation in the examination of scientific research and scientific and industrial work projects;

- participation in the development of regulatory methodological documents in the field of conducting hydrogeological and engineering-geological works;

q. organizational and managerial service:

- planning and organization of scientific research and scientific-industrial field, laboratory and interpretative work;

- planning and organizing scientific and scientific-industrial seminars and conferences;

p. scientific and pedagogical service:

- participate in the preparation and conduct of seminars, practical classes and practices;

- participate in guiding the scientific and educational work of students in the field of geology.

2. Objects of professional activity

- Earth, crust, lithosphere, rocks, aeration zone, groundwater, artesian water, groundwater deposits;

- physical properties of rocks, filtration ability;

- groundwater, drinking water, mineral and technical waters;

of the educational program :

To train competitive specialists who meet the modern requirements and

demands of the geological exploration and hydrogeological and engineering-geological markets, who can use modern materials, technologies, and innovative methods in the design and organization of hydrogeological and engineering-geological work .

- Ensuring the training of specialists for scientific research and design work in the field of search, exploration, and exploitation of groundwater deposits ;

-Training specialists for production and technological activities that ensure the introduction and use of new methods of searching for, exploring, and exploiting groundwater deposits.

- The readiness of specialists to search for and obtain new information necessary for solving professional tasks in the field of integration of knowledge related to their field of activity, active participation in the activities of an enterprise or organization.

-Readiness of specialists to engage in organizational, managerial and service activities, to feel responsible for making their professional decisions, having clearly and deeply substantiated their position on scientific-informational, ideological and problem communications in a professional environment and with a non-specialist audience.

-Readiness of specialists for self-education and continuous professional development at all stages of scientific or professional activity.

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

By the end of the educational program "8D05202 Hydrogeology and Engineering Geology", doctoral students will be able to:

- To apply advanced knowledge in the field of Hydrogeology and Engineering Geology in his professional and academic career.
- Independently understand and apply appropriate analysis methods, and best collect and integrate information in accordance with geological, hydrogeological, and engineering geological industry standards.
- Demonstrate skills in teaching and supervising undergraduate and graduate students
- Able to conduct independent research that contributes to the development of hydrogeological science in accordance with best practices and standards in the hydrogeological and engineering-geological fields.
- To contribute to the formation of a highly educated person with a broad mindset and culture, able to apply advanced knowledge in Hydrogeology and Engineering Geology in his professional and academic career
- Demonstrates high professional research and cognitive skills during the preparation and defense of a doctoral dissertation.
- The following forms of exams are used to assess learning outcomes: written

exam, practical (open questions, problem solving), research work.

- Final certification culminates in a doctoral dissertation.

4. Educational program document

4.1. General information

No.	Name	Note
1	Education sector code and classification	8 D 05 Natural Sciences Mathematics and Statistics
2	Code and classification of training areas	8D 052 Environment
3	Group of educational programs	D 088 - Hydrogeology and engineering geology
4	Name of the educational program	8 D 05202 –Hydrogeology and engineering geology
5	Brief description of the educational program	Hydrogeology and engineering geology are scientific disciplines that study the interaction of groundwater and rocks, the chemical and physical and mechanical properties of groundwater as complex solutions and multiphase systems of rocks, as well as the processes developing in rock massifs, their properties, structure and dynamics, the rational use of the geological environment and its protection, engineering and economic, primarily related to human engineering and construction activities.
6	The purpose of the educational program	highly qualified specialists of the new generation in the field of hydrogeology and engineering geology, who are in demand in the labor market and are called upon to implement state programs aimed at digitizing geological and hydrogeological information of the Republic of Kazakhstan and industrial and innovative development . Training of specialists with a high professional culture, who have a civic stance, are able to formulate and practically solve modern scientific and practical problems, form modern environmental thinking in them, have a knowledge base, master scientific and research skills, participate in scientific activities at various levels, know the methodology of conducting scientific research that allows them to teach in higher educational institutions, and successfully implement research and management activities in the field of hydrogeology and engineering geology.
7	Type of educational program	production and technological; organizational and managerial; experimental research : accounting, project and analytical
8	Level according to the National Curriculum	7
9	Level of Secondary Education	7
10	Special features of the educational program	No

11	of competencies of the educational program :	1. Natural science and theoretical and worldview competencies; 2. Socio-personal and civic competencies; 3. General engineering professional competencies; 4. Communicative and virtual competencies
12	Learning outcomes of the educational program:	• To contribute to the formation of a highly educated individual with a broad worldview and culture, able to apply advanced knowledge in hydrogeology and engineering geology in their professional and academic careers • Demonstrate fundamental and advanced knowledge in the field of hydrogeology and engineering geology to set and solve research and production tasks • Use the acquired knowledge when conducting specific field or research work to solve problems of hydrogeology and engineering geology • Conducting hydrogeological and engineering-geological field measurements, visualizing the results based on comparison with comprehensive data, drawing conclusions and scientific conclusions to understand the structure of the material and identify the features of the work results • To critically analyze, present, defend, discuss and disseminate the results of one's professional activities, relying on modern methods of scientific communication in the state and foreign languages, in order to solve the tasks of professional activity. • Synthesize original ideas and work results from scientific publications at various levels to obtain new conclusions in the field of hydrogeology and engineering geology • Professional solution of hydrogeological and engineering geological problems based on independent collection, analysis and generalization of a priori geological information for systematic analysis, interpretation and interpretation of the results obtained
13	Teaching object	daytime
14	Study period	3 years
15	Loan amount	1 8 0
16	Languages of instruction	Russian Kazakh English
17	Academic degree awarded	PhD Doctor of Natural Sciences
18	Developer(s) and authors:	A bsametov M.K. Auelkhan B.

4. 2. The relationship between the educational program and the achievement of learning outcomes formed in academic subjects

No.	Subject name	Brief description of the subject	Number of credits	Learning outcomes to be formed (codes)								
				ON1	ON2	O3	O4	O5	O6	O7		
Basic subjects cycle												
Higher education institution component i												
	Academic writing	Purpose: To form the system competencies of doctoral students and young researchers in the field of academic writing as a key tool for scientific communication and publication activities. Content: Scientific discourse and academic communication; Typology of scientific texts: from dissertation to publication; Creation of original scientific content; Scientific text: structure and logic of construction; Comparative analysis of sources and preparation of a literary review; Work with metadata and scientometric tools; Preparation of articles for international peer-reviewed journals; Work with reviews and the scientific community; Academic mobility and grant support for research; Annotations, patents, reports: science beyond the article; Planning of publication strategy and research career; English language of scientific	5						v			

		communication..										
	Methods of scientific research	Purpose: It consists in mastering knowledge about the laws, principles, concepts, terminology, content, specific features of the organization and management of scientific research using modern methods of scientometry. Contents: structure of technical sciences, application of general scientific, philosophical and special methods of scientific research, principles of organization of scientific research, methodological features of modern science, ways of development of science and scientific research, the role of technical sciences, computer science and engineering research in theory and practice.	5		v							
Cycle of core subjects The selection component												
	Hydrogeological, engineering geological mapping and surveying	The purpose of the discipline: interpretation of aerial photographs and aerial visual observations; route observations; excavation of mine workings (wells, pits, etc.); geophysical research; field studies of soil properties, including static and dynamic sounding; laboratory studies of the composition and properties of soils and the chemical composition of groundwater; experimental filtration works of hydrogeological wells; stationary observations; special	5		v							

		types of engineering-geological studies provided for by the program; cameral processing and preparation of reporting materials. Ground-based methods for obtaining direct information about the engineering-geological conditions of the territory, use in surveys of any scale, their role in large-scale surveys, the level of their implementation determines the reliability and quality of the information received.										
	Functionality, modeling, calculations and their practical application in Hydrogeology: Educational Program Visual MODFLOW Flex	Software for modeling the movement of groundwater and pollutants. Visual MODFLOW Flex combines industry standards for groundwater and pollutant transport, essential analytical and calibration tools, and stunning 3D visualization capabilities in a single, easy-to-use software environment. With Visual MODFLOW Flex, professionals have all the tools they need to address local and regional water quality, groundwater, and water source issues.	5			v						
Cycle of introductory subjects University component												
	Burial of industrial wastewater into the subsoil	The purpose of the discipline: hydrogeological information to address the issue of industrial waste disposal in deep aquifers, teach methodically correctly and purposefully to carry out a set of necessary hydrogeological	5				v					

		studies. Utilization and neutralization of liquid industrial effluents of various origins is the most important environmental task. A landfill is a complex of underground (wells for various purposes, including injection wells) and surface facilities designed to accommodate specially prepared liquid (or solid, having the ability to dissolve in water) waste in an absorbing horizon that ensures their safe storage for the foreseeable future										
	Applied studies in hydrogeology	The scientific and methodological aspects of the implementation of the tasks of applied areas of hydrogeology are considered. When characterizing prospecting and exploration work as one of the main applied areas of hydrogeology, a theoretical justification is given for the methodology for choosing the most optimal method for estimating operational reserves separately for drinking, as well as thermal power, industrial, mineral groundwater during prospecting and exploration work at groundwater deposits. The main emphasis is placed on the use of modern methods and software products in interpreting the results of experimental filtration works, assessing the parameters of	5		v							

		aquifers, assessing reserves, and determining zones of sanitary protection of deposits.										
Cycle of introductory subjects Component according to by choice												
	Intellectual property and the global market	Purpose: the goal is to train specialists in the field of intellectual property law who can analyze and predict trends in its development in the global market, develop strategies for the protection and commercialization of intellectual property. Contents: global aspects of intellectual property and its role in international trade and economics, analysis of international agreements and conventions, IP management strategies, cases of protection and violation of intellectual property rights in various jurisdictions.										

5. Curriculum of the educational program



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

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

WORKING CURRICULUM

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

2025-2026 (Spring, Autumn)
D088 - "Hydrogeology and geology engineering"
8D05202 - "Hydrogeology and engineering geology"
Doctor of Philosophy PhD
full time (scientific and pedagogical track) - 3 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	Lk/Lab/pr Contact hours	in hours SIS (including TSIS)	Form of control	Allocation of face-to-face training based on courses and semesters						Prerequisites	
									1 course		2 course		3 course			
									1 sem	2 sem	3 sem	4 sem	5 sem	6 sem		
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)																
CYCLE OF BASIC DISCIPLINES (BD)																
M-1. Module of basic training (university component)																
MET322	Methods of scientific research		BD, UC	5	150	30/0/15	105	E		5						
LNG305	Academic writing		BD, UC	5	150	0/0/45	105	E		5						
GEO339	Functionality, modeling, calculations and their practical application in Hydrogeology: Educational Program Visual MODFLOW Flex	1	BD, CCH	5	150	30/0/15	105	E		5						
MNG349	Intellectual property and the global market	1	BD, CCH	5	150	30/0/15	105	E		5						
GEO319	Hydrogeological, engineering-geological mapping and surveying	1	BD, CCH	5	150	30/0/15	105	E		5						
M-3. Practice-oriented module																
AAP350	Pedagogical practice		BD, UC	10				R	10							
CYCLE OF PROFILE DISCIPLINES (PD)																
M-2. Module of professional activity (university component)																
GEO336	Applied studies in hydrogeology		PD, UC	5	150	30/0/15	105	E		5						
GEO321	Burial of industrial wastewater into the subsoil		PD, UC	5	150	30/0/15	105	E		5						
M-3. Practice-oriented module																
AAP355	Research practice		PD, UC	10				R			10					
M-4. Experimental research module																
AAP347	Research work of the doctoral student, including internships and doctoral dissertation		RWDS	20				R	20							
AAP336	Research work of the doctoral student, including internships and doctoral dissertation		RWDS	5				R		5						
AAP347	Research work of the doctoral student, including internships and doctoral dissertation		RWDS	20				R			20					
AAP356	Research work of the doctoral student, including internships and doctoral dissertation		RWDS	30				R				30				
AAP356	Research work of the doctoral student, including internships and doctoral dissertation		RWDS	30				R					30			
AAP348	Research work of the doctoral student, including internships and doctoral dissertation		RWDS	18				R							18	
M-5. Module of final attestation																
ECA325	Final examination (writing and defending a doctoral dissertation)		FA	12											12	
Total based on UNIVERSITY:										30	30	30	30	30	30	
										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

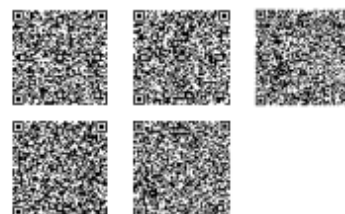
GED	Cycle of general education disciplines	0	0	0	0
BD	Cycle of basic disciplines	0	20	5	25
PD	Cycle of profile disciplines	0	20	0	20
Total for theoretical training:		0	40	5	45
RWDS	Research Work of Doctoral Student				123
ERWDS	Experimental Research Work of Doctoral Student				0
FA	Final attestation				12
TOTAL:					180

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

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

Signed:
 Governing Board member - Vice-Rector for Academic Affairs
 Uskenbayeva R. K.

Approved:
 Vice Provost on academic development
 Kalpeyeva Z. B.
 Head of Department - Department of Educational Program
 Management and Academic-Methodological Work
 Zhurnagaliyeva A. S.
 Director - Geology and Oil-gas Business Institute named after
 K. Turysaev
 Aseyelkhan Y. .
 Acting Department Chair - Hydrogeology, Engineering and
 Oil and Gas Geology
 Akparbayev R. C.
 Representative of the Academic Committee from Employers
 Absanetov M. K.
 ____Acknowledged____



Note:

1. The department's basic training and professional activity module determines the names of the modules and their number.
2. * - Division into types of work at the discretion of the department
3. If necessary, the following subjects: Physics II, Mathematics III, General Chemistry of the department are included at the expense of credits from the basic training module of the department, the component of the Department of Physics.
4. The full academic load for one academic year should be 60 academic credits.
5. The appendix to the catalog of elective subjects, as well as the curriculum, is divided into modules, including the "R&D" module.