



Geology and Oil-gas Business Institute named after K. Turysov
Department of "Hydrogeology, Engineering and Oil and Gas Geology"

EDUCATIONAL PROGRAM

6B05207 Geology of fossil fuels

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

Educational program 6B05207 Geology of fossil fuels

code and name of educational program

was approved at the meeting of K.I. Satbayev KazNRTU Academic Council

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KazNRTU Educational and Methodological Council

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

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List of abbreviations and symbols

DB – basic disciplines
SSO – state mandatory standard of education DP-documented procedure
UNT - unified national testing IEP - individual curriculum
KTO-credit technology of teaching
QED-catalog of elective subjects
MOE-modular educational program
R & D –research work
R & D and Publishing House - research work and innovation activities
R & D Center – research work of students
OOD – general education disciplines
OP-educational program
PD-profile disciplines P
C – personal computer
Teaching staff – Faculty of the Republic of Kazakhstan
RUP – working curriculum
QMS-quality management system
QMS-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 educational 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 high-quality undergraduate education.

Last but not least, the goal of the EP is to establish a common framework for the feasibility and necessity of a "Fuel Geology" training program for all stakeholders, including government, government agencies, the oil and gas industry, universities, undergraduates

, and the community. It is intended for the implementation of scientific and pedagogical training of bachelors in the educational program of the specialty "Geology of fossil Fuels" 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:

- The 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 No. 111 dated 19.01.12

"On approval of the Standard rules for admission to study in educational organizations that implement educational programs of higher education" with amendments and additions dated 14.07.16 No. 405.

- Resolution of the Government of the Republic of Kazakhstan No. 1042 dated 13.08.12

"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 educational program

The purpose of the OP: The purpose of the educational program "Geology of Fossils Fuels" is to train bachelors in the field of geological study, prospecting and exploration works, delineation and evaluation of resources of combustible fossil deposits that meet the requirements of modern economy in the field of hydrocarbon sector.

Training in this educational program is aimed at preparing bachelors in geology, geochemistry and geophysics; designing and conducting all types of production and research work on the geological maintenance of hydrocarbon deposits; conducting scientific research on separate sections (stages, tasks) of the topic together with the scientific supervisor; complex experiments and observations in field expeditions and research projects. carry out processing and analysis of the results of geophysical, geological and geochemical experiments and studies; compile summary reports and recommendations based on the results of scientific research.

Types of employment:

- production and technological;
- organizational and managerial;
- experimental and research;
- calculation and design and analytical work

Depending on the type of professional activity, a bachelor's degree in the specialty "Geology of Fossil Fuels" is prepared to solve the following professional tasks:

a) production and technological activities:

- implementation and conduct of geological and engineering geological observations using modern technical means;
- compliance with standards, norms and rules of technical operation of field geological information;
- primary documentation of field geological data and engineering and technical support.

geological works;

- solution, collection and processing, generalization of stock geological data of production tasks in the course of field and engineering geological 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;

- preparation of geological maps, diagrams, sections, tables, graphs and other established reports in accordance with approved forms, development of methodological documents in the field of geological survey, prospecting, exploration, operational work, geological and economic assessment of subsurface use objects;

- implementation of measures for the safe conduct of geological and engineering-geological works and protection of personnel and the environment at all stages of production;

- b) organizational and managerial:

- planning and organization of scientific research and production field, laboratory and interpretation works;

- planning and organization of scientific and industrial seminars and conferences;

- c) experimental and research:

- collection and systematization of scientific and technical information of domestic and international experience in relation to solving geological, engineering and geological problems;

- mathematical modeling of oil and gas processes and geological engineering 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:

- understanding of the origin, composition and properties of oil and gas, chemical transformations of oil and natural gas components;

- conducting a preliminary feasibility study of project calculations;

- Objects of a graduate's professional activity:

- prospecting and exploration of minerals, analysis of actual and stock materials, research of prospective areas of oil and gas fields.

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

- study of the origin and location of deposits of combustible minerals;

- physical and chemical composition, properties, genetic and technological classifications, as well as practical use of each type of fossil fuel;

- use of modern methods of analysis of substances of oil, natural gas, solid fuels, mathematical processing of the obtained geological and geochemical information

- 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-scientific, general technical and economic disciplines, as the foundation of professional education;

- the cycle of core disciplines is focused on the study of key theoretical aspects of geology, oil and gas, as well as operational work in the fields of fossil fuels.

- study of disciplines that form knowledge and skills of planning and organizing research, design, analysis of the results of geophysical, geological, geochemical 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

Bachelor's degree in the specialty "Geology of fossil fuels":

- Show sociability, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions.

- Creation and development of integrated biocomputer software.

- Have excellent programming skills.

- Ability to develop new algorithms.

The following forms of examinations are used as assessment of learning outcomes: written examination (answers on sheets), practical examination (open questions, problem solving), research work Final certification bachelor's degree defense and completion of the diploma project.

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	6B052 Environment
3	Group of educational programs	B052 Earth Science
4	Name of the educational program	Geology of fossil fuels
5	Brief description of the educational program	Geology of fossil fuels-an applied science that studies the deposit of minerals, their structure, composition, formation conditions, and patterns of placement in the Earth's interior. The forecast of distribution, prospecting, evaluation and exploration of mineral deposits is also studied. Combustible minerals are one of the sources of

		energy, an important technological fuel in ferrous metallurgy, and are also used in the chemical industry.
6	Purpose of the OP	he purpose of the educational program "Geology of Fossils Fuels" is to train bachelors in the field of geological study, prospecting and exploration works, delineation and evaluation of resources of combustible fossil deposits that meet the requirements of modern economy in the field of hydrocarbon sector.
7	Type of OP	production; research; organizational and managerial; production and technological.
8	Level according to NRC	6
9	Level according to 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 Proficiently and effectively, assess the temporary economic, political, cultural, ecological, scientific-technical situations. 2 Conduct calculations and experiments with expertise in the field of mineralogy, petrography, geological surveying, prospecting, and exploration of deposits of combustible minerals. 3 Determine the most optimal method for prospecting and exploration of combustible mineral resources based on general geological, tectonic, lithological, and geochemical parameters of prospective zones and areas. 4 Classify combustible mineral resources based on their chemical composition, physical properties of hydrocarbon and aqueous fluids, filtration-capacity parameters of reservoirs, and the prospective resources of deposits. 5 Apply modern methods of geological surveying, cartography, and modeling during the stages of regional study of prospective areas and further exploration and delineation of geological works. 6 Utilize mathematical methods of analysis in conducting scientific and applied research in the field of hydrocarbon resources. 7 Apply innovative methods of field investigations on geological outcrops and during drilling of wells for the exploration and prospecting of deposits of combustible mineral resources, including the use of modern modeling techniques to assess recoverable reserves. 8 Apply modern geological, geophysical, and geochemical methods to solve geological problems during prospecting and exploration, as well as in the

		course of research during and after drilling wells. 9 To demonstrate high professional qualities and ethics at various stages of geological exploration of a promising territory, while managing production exploration tasks taking into account the criteria of sustainable development. 10 Integrate theoretical and practical data to solve geological, geodynamic, and geochemical problems and to calculate hydrocarbon reserves. 11 Analyze the results of geological and hydrodynamic observations and investigations of both productive parts of deposits and the underlying and surrounding underground waters during the preparation for the development and extraction of combustible mineral resources.
13	Education form	full
14	Period of training	4 years
15	Amount of credits	240
16	Languages of instruction	Kazakh, Russian, English
17	Academic degree awarded	Bachelor of Science
18	Developer(s) and authors	Yensepbaev T.A., Uzbekkaliev R.Kh., Omirezakova E.Zh. Dzharasova T. 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												
4.	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			/						
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	v								
6.	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	2									

		preserve and strengthen health, psychophysical training and self-training for various types.										
7.	CSE 677 Information and Communication Technologies (in English)	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								
8.	HUM 137 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	v								
9.	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								

10	HUM 120 Module of Socio-political knowledge (Sociology, Political science)/	The aim 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								
11	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 University component												
12	HUM 136 Fundamentals of anti-corruption culture and law	The course introduces students to the improvement of socio-economic relations of Kazakhstan society, Psychological features of corruption behavior. Special attention is paid to the formation of an anti-corruption culture, legal responsibility for corruption acts in various spheres. The purpose of studying the discipline "Fundamentals of anti-corruption culture and Law" is to increase the public and individual legal awareness and legal culture of students, as well as to form a system of knowledge and	5	V								V

		civic position on combating corruption as an anti -social phenomenon. Expected results: implement the values of moral consciousness and follow moral norms in everyday practice; work on improving the level of moral and legal culture; use spiritual and moral mechanisms to prevent corruption.										
13	MNG 489 Fundamentals of Economics and Entrepreneurship	The discipline examines the fundamentals of economics and entrepreneurship from the point of view of science and law; features, problematic aspects and development prospects; theory and practice of entrepreneurship as a system of economic and organizational relations of business structures; readiness of entrepreneurs to innovate receptivity. The discipline reveals the content of entrepreneurial activity, stages of career stages, qualities, competencies and responsibilities of an entrepreneur, theoretical and practical business planning , economic expertise of business ideas, as well as risk analysis of innovative development, introduction of new technologies and technological solutions.	5	V								
14	PET 519 Fundamentals of scientific research methods	For the purpose of studying the academic discipline The main goal is to develop students ' skills in research activities; to introduce students to scientific knowledge, their readiness and ability to conduct research. Objectives of the discipline: contribute to the deepening and consolidation of students ' existing theoretical knowledge; develop	5	/				v v	v			

		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.										
15	CHE 656 Ecology and life safety	The discipline studies the problems of ecology as a science, environmental terms, laws of functioning of natural systems and aspects of environmental safety in working conditions; environmental monitoring and management in the field of its safety; sources of atmospheric air, surface, underground water, soil pollution and ways to solve environmental problems; life safety in the technosphere; natural and man-made emergencies	5	V								V
Cycle of basic disciplines University component												
16	MAT 101-102 Mathematics I, II	Course is designed to study the basic concepts of higher mathematics and its applications. The main provisions of the discipline are used in the study of all general engineering and special disciplines	10		V				v			

		taught by the graduate departments. The course sections include elements of linear algebra and analytic geometry, introduction to analysis, and differential calculus of functions of one and several variables. Methods of solving systems of equations, application of vector calculus to solving problems of geometry, mechanics, and physics are considered. Analytical geometry on the plane and in space, differential calculus of functions of one variable, derivative and differentials, investigation of the behavior of functions, Direction derivative and gradient, extremum of a function of several variables.										
17	PHY 468 Physics	The course examines the basic physical phenomena and laws of classical and modern physics; methods of physical research; the influence of physics as a science on the development of technology; the relationship of physics with other sciences and its role in solving scientific and technical problems of the specialty. The course covers the following sections: Keywords:	5				v			v		

		mechanics, mechanical harmonic waves, fundamentals of molecular kinetic theory and thermodynamics, electrostatics, direct current, electromagnetism, geometric optics, wave properties of light, laws of thermal radiation, photoelectric effect.										
18	GEN 429 Engineering and Computer Graphics /	Purpose The discipline is the study of object image techniques and general drawing rules, using computer graphics. Summary: basic principles and geometric modeling approaches and methodologies for developing applications with a graphical interface. Formation of graphic systems for drawing development, using 2 D and 3 D modeling methods.	5					V		V		
19	GEO431 General and historical geology /	The essence and content of the discipline, its scientific and practical significance, methods of studying geological processes are studied. phenomena. 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,	4			V		v		v		

		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.										
20	GIN 148 Geology of sedimentary basin structures	The purpose of the discipline: is to introduce students to the study of the evolution of various types of sedimentary basins and their structure. Purpose: preliminary forecasting, justification location justification, characterization of potential hydrocarbon reservoirs. Content of the discipline: study of stratigraphy, sedimentology, geological and tectonic structure, geophysical and geochemical properties of rocks composing the basin, construction of geological maps, sections, stratigraphic columns, and restoration of the history of geological	5			V		v		v		

		development.										
21	GEO196 Crystallography and mineralogy /	Purpose of the discipline: formation of students ' knowledge for the basic concepts and laws of crystallography, classification of crystals based on their symmetry, which studies the external and internal structure of crystal chemistry, crystal physics. Summary: Influence of the structure on the external shape and physical properties of crystals. Conditions of origin of minerals in nature. Physical properties and composition of minerals. Basic laws and physical properties of crystal structure, as well as conditions of their formation	6		V	V	v					
22	GEO434 Petrography	Discipline objective: Main geological processes, origin of the most common minerals and rocks, landforms, elementary geological structures, assessment of formation conditions, petrographic diagnostic methods. Summary: Classification of igneous, sedimentary, metamorphic, and metasomatic rocks, nomenclature and conditions of rock formation and their relations with mineral deposits; use of petrographic information for restoration of rock formation processes.	5		V	V	v					
23		Purpose: to develop knowledge on fundamental issues of general	5			V	v					

	GNE 495 General Chemistry	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.										
24	GEO508 General hydrogeology	The purpose of the discipline is to study the origin, conditions of occurrence, composition and regularities of the movement of underground water. The interaction of groundwater with rocks, surface water, and the atmosphere is also being studied. The scope of this science includes such issues as dynamics of underground waters, hydrogeochemistry, search and exploration of underground waters, as well as land reclamation and regional hydrogeology. Hydrogeology data are used, in particular, to address issues of water supply, land reclamation and irrigation, and the environmental consequences of hydraulic engineering construction	5				v					

		(reservoirs,etc.).										
25	GEO 414 Geodesy with topography basics/	The purpose of this course is to provide students with the necessary fundamental knowledge about a 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 image on maps of elements of cartographic content: hydrographic objects, topography, vegetation and soil, communication routes, communications. During the construction process, geodesic methods are constantly checked for the correct installation of building structures in the design position	5					V		v	v	
26	GEO411 Geophysical methods of prospecting and exploration /	The purpose of the discipline: it is a complex of sciences that studies the physical and geological foundations, methods, processing and interpretation of the results of field and geophysical methods (electrical exploration, magnetic exploration, gravity exploration, seismic exploration, radiometry, etc.). nuclear geophysics). Summary: the physical properties of rocks and the nature associated with the physical field are considered. Geophysical methods of prospecting and exploration are widely used in	5			V		v			v	

		solving problems of geological mapping, prospecting and exploration of ore and hydrocarbon deposits.										
27	GIO582 General Engineering Geology	The purpose 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									
28	GIN135 Calculation of hydrocarbon reserves and resources raw materials	The purpose of the discipline: to equip students with the skills necessary to assess the quantity and quality of hydrocarbon resources by various methods present in the subsurface, and the strategy of extracting hydrocarbons from the subsurface. Assigned disciplines: teach a comprehensive approach to studying deposits, structure, and phase composition of hydrocarbons. Summary: geological and engineering principles underlying the estimation of hydrocarbon reserves and resources, classification and characterization of hydrocarbon reserves and resources, methods of their calculation.	5				v			v		

29	RET406 Well drilling /	Drilling the purpose of the well is 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 of a comprehensive core study in predicting and developing 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			V				v	v	
30	GEO439 Sedimentology	The aim of the discipline is to study the processes of education, transport and sedimentation of sedimentary rocks on the ground. Tasks include analysis of sedimentary structures, textures, and rock composition, as well as determining the conditions of their formation. The purpose of the discipline is to understand the evolution of the environment, reconstruct the situation of sedimentation, climatic and geological events. The content includes the study of sedimentary processes, rock classification, analysis of sedimentary basins and their history	5		V	V				v		
31		The purpose of the discipline: to introduce students to the definition of paleogeographic	5		V	V	v			v		

	GEO 610 Lithology	conditions for the formation of sedimentary rocks. Summary: Improvement of methods for studying sediments and sedimentary rocks. Study of mineral composition, structures, textures, and basic types of sedimentary rocks. Investigation of detrital minerals of sedimentary rocks for correlation of sedimentary strata . Determination of conditions of formation and change of sedimentary rocks by authigenic minerals. Elucidation of formation conditions, definition of facies analysis										
32	GIN 154 Evolution of lithospheric plates	Purpose: formation of students ' fundamental principles of plate tectonics, understanding of processes forming the lithosphere, plate boundaries, volcanic activity, mountain formation and sedimentary basins. Purpose of the discipline: to teach the student to identify and analyze geodynamic processes for solving practical problems. Contents: Basic principles of plate tectonics, types of plate boundaries, geological processes forming the lithosphere, seismic activity , and geodynamic features of the formation of various types of basins and folded structures.	6			V		v		v		

33	AAP164 Trainingпрактикаpractice/	It is intended for gaining experience in primary professional activity, thanks to which students are prepared for the assignment of qualification categories in one or several working professions according to the profiles of the corresponding programs	2	v	v						v	
Cycle of basic disciplines Elective component												
34	AAP164 Trainingпрактикаpractice/	It is designed to gain experience in primary professional activity, which provides students with training for the assignment of qualification categories in one or several working professions according to the profiles of the corresponding programs	2 2	v	v						v	
35	AAP164 Trainingпрактикаpractice/	It is designed to gain experience in primary professional activity, which provides students with training for the assignment of qualification categories in one or several working professions according to the profiles of the corresponding programs. substances.		v	v						v	
36	GEO613 Sedimentary basins of the world and Kazakhstan	Purpose: to study the geological and geodynamic history of sedimentary basins at the global and regional levels. Tasks include analysis of the structure and composition of sedimentary deposits, studying the evolution of basins and geological processes that led to the formation of mineral deposits. Purpose: to understand the formation and development of sedimentary basins and their resource potential. The content includes the study of the main	5	V		V		v				

		sedimentary basins of the world and Kazakhstan, their geological history, and features of the structure of sedimentary deposits.										
37	GEO611 Geostatistics and modeling methods	The purpose of the discipline: to study the application of mathematical methods in geology and geostatistical techniques for estimating resources and reserves of mineral deposits. Summary: features of the current stage of development of computer technologies, the possibility of applying mathematical methods and the use of statistical techniques in solving geological problems. Basic theoretical foundations of geostatistics and its application to the analysis of geological exploration.	5					v	v	v		
38	GIN137 Geology, search and exploration of hydrocarbon deposits	The purpose of the discipline: To study the regularities of the conditions of formation and location of fossil fuels, methods of their search and exploration. Objectives: to study the evolution of natural hydrocarbon compounds from living matter to combustible minerals, the stages of formation of oil systems, physical and chemical properties of the composition of combustible minerals, methods of prospecting and exploration of fossil deposits, their geological zoning based on the laws	4			V	V	V		V		V

		of formation and their distribution to ensure access to inexpensive, reliable and modern energy sources (SDGs 7)										
39	GEO644 Introduction to the specialty	Purpose of the discipline: they are the first step in the system of training students of geological specializations such as geological engineers, geologists, geophysicists, hydrogeologists and other specialties. Краткое Summary initial theoretical skills in the chosen specialty, teach you to navigate in the sections of the geology of combustible, liquid and solid minerals and understand, analyze the basic knowledge of natural resources. concepts and terms of the specialty.	4					v				V
	Fundamentals of oil and gas business	The purpose of studying the discipline is to form basic knowledge about the oil and gas sector of the industry, the idea of the profession and prepare for the study of general technical disciplines. Tasks: introduction to the basic concepts and concepts of oil and gas engineering; introduction to the current state of the oil and gas industry in the world and Kazakhstan; with basic information about field exploration, well drilling, pipeline and storage facilities design.	5				V				V	

Cycle of profile disciplines University component											
40	GIN138 Fuel reservoir physics	The purpose of the discipline: formation of students ' knowledge and skills, development of competencies in the field of theory and practice. Summary: study of filtration- capacity, physical-mechanical and thermal properties of rocks, composition and physico-chemical properties of reservoir fluids saturating reservoir rocks, phase transitions of hydrocarbon systems, surface- molecular phenomena occurring in	5				V				
41	GIN138 GIN138 Fuel reservoir physics	The purpose of the discipline: formation of students ' knowledge and skills, development of competencies in areas of theory and practice. Summary: study of filtration- capacity, physical-mechanical and thermal properties of rocks, composition and physicochemical properties of reservoir fluids saturating reservoir rocks, phase transitions of hydrocarbon systems, surface- molecular phenomena occurring in the reservoir, properties of the oil-gas-	5				V				

		water-rock system that determine the filtration of reservoir fluids from porous media, operating modes of deposits.										
42	GIN153 Tectonics and geodynamics of sedimentary basins	Objective: to study the relationship between tectonic processes and the formation of sedimentary basins. Tasks include analyzing the structural features of basins, studying deformations and movements of the Earth's crust, and studying the influence of tectonics on sedimentary processes. The purpose of the discipline is to understand the evolution of sedimentary basins in the context of geological and geodynamic history. The content includes the study of tectonic structures, deformation mechanisms, seismic activity and their influence on the formation and evolution of sedimentary basins.	6			V		V				
43	GEO619 Modeling of geological processes and oil and gas	fields. The purpose of the course is to learn about the basic capabilities of image editors, including the Petrel software package. Modeling of oil and gas fields and deposits allows solving problems of delineating deposits, estimating reserves, determining the quality of hydrocarbons, geological and economic assessment of	5					V	V	V		

		deposits, and preparing exploration and development projects. As well as the development of hydrocarbon deposits is aimed at the most complete extraction of their recoverable reserves with maximum economic profitability										
44	GIN 152 Geology of fossil	fuels The purpose of the discipline is to study the formation conditions, patterns of oil, gas, condensate placement, their composition and properties. The purpose of the discipline is aimed at forming a systematic a p p r o a c h to study the geological processes that led to the formation, accumulation, and formation of hydrocarbon deposits. The course describes the geological processes that led to the formation and accumulation of hydrocarbon deposits, methods for calculating geological, recoverable reserves of hydrocarbon deposits, design and optimization of drilling for further hydrocarbon production.	5				V				V	
45	GEO 472 Engineering Geodynamics	The aim of the discipline is to develop and acquire practical skills in studying the state and dynamics of the upper horizons of the Earth's crust in engineering and geological terms. The objectives of the discipline are to study the geological and zonal conditions of formation and development of geological and	5								V	

		engineering-geological processes, to characterize the distribution and forms of manifestation of endogenous and exogenous geological processes and their factors and causes and m e c h a n i s m o f d e v e l o p m e n t of modern processes, methods of their study and prediction and control.										
46	GIN 140 Protection and rational use of subsurface	resources The aim of the discipline is to develop an understanding of the necessity, principles and significance of rational and integrated use of subsurface resources, based on the results of compliance with existing norms and regulations, deposits of combustible, liquid and solid minerals. Summary: qualitative and quantitative ecological and economic assessment of field development and necessary environmental protection measures, the degree of impact of oil and gas production facilities on the environment.	5									V
47	GIN 142 Geochemistry of fossil	fuels The purpose of the discipline: to form students ' understanding of fossil fuels, accumulation and systematization of knowledge about the generation, accumulation of hydrocarbons, as well as the conditions of occurrence of these minerals in the bowels of the Earth. Tasks: mastering the discipline is	6			V	V					V

		aimed at acquiring knowledge about the properties and composition of hydrocarbons, the generation and accumulation of hydrocarbon fluids and solid fuels, the conservation of deposits, and also contains information about organic matter and possible methods of its research.										
48	GIP 102 Geophysical well research	The course aims to study the physical foundations of geophysical methods and their practical application in obtaining rough documentation of oil and gas wells. As a result of the training, the bachelor will have theoretical knowledge about the distribution of physical fields of various nature, classification of GIS methods, the range of geological and technical problems to be solved, hardware and methodological complexes, work methods, the basics of interpreting GIS data in an open wellbore, operations in wells and development control.	4			V				V	V	
49	GIN 143 Geology of exploited deposits	The purpose of the discipline is to analyze and typify the geological conditions of fossil fuel deposits for the purposes of their effective industrial development. Summary: Improvement of methods, tools, technology and organization of geological study of exploited deposits. Improving the efficiency of	5				V					

		additional exploration, operational exploration and geological and industrial assessment of deposits in the process of their development. Mastering information technologies for searching, collecting, storing and processing geological information. information.										
50	GEO 632 Fundamentals of subsurface	use The purpose of the discipline is to study the legal framework in the field of subsurface use in Kazakhstan. Students will know the specifics of licensing the activities of subsurface users and acquire the skills of drafting documents to the competent authorities. They will be able to solve practical issues of collecting, processing, and storing geological information, using basic information and analytical products in the field of subsurface use, and drawing up simple estimates for exploration projects.	5	V							V	V
51	GIN 145 Geochemical methods of searching for fossil fuels	The purpose of the discipline is to gain an understanding of the theoretical prerequisites and practical implementation of geochemical methods of searching for fossil fuels. Objectives of the discipline study of the principles and methods of geochemical analysis, including mass spectrometry, gas chromatography and other modern methods of	6			V	V				V	

		analysis. As a result of studying this discipline, students acquire the skills and abilities necessary to work in the field of search and exploration of caustobiolites.										
52	Production practice I-II	The purpose of the training practice is to consolidate and deepen the theoretical knowledge gained (experience in acquiring initial professional skills and abilities); to acquire the necessary skills and abilities in the chosen specialty; to expand ideas about future professional activities, to increase the student's information and communication level, to teach elements of control and communication.	5		V						V	V
Cycle of profile disciplines Elective component												
53	GEO 625 Petrography of sedimentary rocks of oil and gas bearing regions of Kazakhstan	The purpose of the discipline: to select an understanding of the composition, structure, conditions of occurrence, classification and regularities of the formation of igneous and metamorphic rocks that meet the modern level of science and the requirements of geological practice. Summary: introducing students to the modern theory of lithology, basic concepts, classifications, features of chemical and mineral compositions, structure (structure and texture) and the	5		V	V	V				V	

		genesis of sedimentary formations of rocks and silts.										
54	GEO 624 Methods of laboratory research of organic matter, oil and gas	The purpose of the discipline: to introduce students to new methods of geochemical research of organic matter in rocks. Summary: Study of the material composition and structure of the void space of reservoir rocks and fluid reservoirs natural reservoirs of oil and gas, the main types of analysis of oil and organic matter used at various stages of exploration, during which geochemical information is processed.	5			V					V	

5. Curriculum of educational program

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



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

WORKING CURRICULUM

Academic year 2025-2026 (Autumn, Spring)
Group of educational programs BB52 - "Earth Science"
Educational program 6B05207 - "Geology of fossil fuels"
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	Lek/lab/pr Contact hours	in hours SIS (including TSIS)	Form of control	Allocation of face-to-face training based on courses and semesters								Prerequisite	
									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							
HUM120	Module of socio-political knowledge (sociology, political science)		GED, RC	3	90	15:0:15	60	E				3						
HUM132	Philosophy		GED, RC	5	150	15:0:30	105	E				5						
M-5. Module of anti-corruption culture, ecology and life safety base																		
CHE656	Ecology and life safety	2	GED, CCH	5	150	30:0:15	105	E				5						
MNG489	Fundamentals of economics and entrepreneurship	2	GED, CCH	5	150	30:0:15	105	E				5						
PET519	Fundamentals of scientific research methods	2	GED, CCH	5	150	30:0:15	105	E				5						
HUM136	Fundamentals of anti-corruption culture and law	2	GED, CCH	5	150	30:0:15	105	E				5						
MNG564	Basics of Financial Literacy	2	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										
AAP164	Educational geological survey practice		BD, UC	2				R		2									
GEO432	Structural geology		BD, UC	5	150	30/15/0	105	E		5									
GEO196	Crystallography and mineralogy		BD, UC	6	180	30/30/0	120	E			6								
CHE495	Chemistry		BD, UC	5	150	15/30/0	105	E			5								
GEO439	Sedimentology		BD, UC	5	150	30/15/0	105	E			5								
GEO434	Petrography		BD, UC	5	150	15/30/0	105	E				5							
GEO610	Lithology		BD, UC	5	150	30/15/0	105	E				5							
GEO613	Sedimentary basins of the world and Kazakhstan	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							
GEO611	Geostatistics and modeling methods	1	BD, CCH	5	150	30/0/15	105	E				5							
MNG563	Fundamentals of sustainable development and ESG projects in Kazakhstan	1	BD, CCH	5	150	30/0/15	105	E				5							
CHE950	ESG principles in inclusive culture	1	BD, CCH	5	150	30/0/15	105	E				5							
GEO508	General hydrogeology		BD, UC	5	150	30/0/15	105	E					5						
GEO414	Geodesy with the basics of topography		BD, UC	5	150	30/15/0	105	E					5						
GEO411	Geophysical methods of search and exploration		BD, UC	5	150	30/15/0	105	E					5						
PET406	Drilling of the wells		BD, UC	5	150	30/15/0	105	E					5						
GIN155	Geology, prospecting and exploration of hydrocarbon deposits	1	BD, CCH	4	120	30/0/15	75	E					4						
GEO644	Introduction to the specialty	1	BD, CCH	4	120	30/0/15	75	E					4						
GEO582	General Engineering Geology		BD, UC	5	150	30/0/15	105	E						5					
GIN141	Geology of fossil fuel deposits	1	BD, CCH	6	180	30/15/15	120	E						6					
GEO627	Mining ecology	1	BD, CCH	6	180	30/15/15	120	E						6					
GIN135	Calculation of reserves and resources of hydrocarbon raw materials		BD, UC	5	150	30/0/15	105	E							5				
PET520	Basic of petroleum engineering		BD, UC	5	150	30/0/15	105	E							5				
GIN154	Evolution of lithospheric plates		BD, UC	6	180	30/15/15	120	E								6			
CYCLE OF PROFILE DISCIPLINES (PD)																			
M-8. Module of professional activity																			
AAP102	Production practice I		PD, UC	2				R				2							
GIN142	Geochemistry of fossil fuels		PD, UC	6	180	30/15/15	120	E				6							
GIN138	Physics of layers of combustible minerals		PD, UC	5	150	15/30/0	105	E					5						
GIN153	Tectonics and geodynamics of sedimentary basins		PD, UC	6	180	30/0/30	120	E					6						
AAP183	Production practice II		PD, UC	3				R					3						
GEO443	Fundamentals of subsoil		PD, UC	5	150	30/0/15	105	E					5						
GEO619	Modeling of geological processes and oil and gas fields		PD, UC	5	150	30/0/15	105	E						5					
GIN140	Protection and rational use of mineral resources		PD, UC	5	150	30/0/15	105	E						5					
GPH102	Well logging		PD, UC	5	150	30/15/0	105	E						5					
GIN152	Geology of fossil fuel fields	1	PD, CCH	5	150	30/15/0	105	E						5					
GEO472	Engineering geodynamics	1	PD, CCH	5	150	30/15/0	105	E						5					
GIN143	Geology of exploited deposits		PD, UC	5	150	30/0/15	105	E							5				
GIN145	Geochemical methods of searching for fossil fuels		PD, UC	6	180	30/15/15	120	E							6				
GEO625	Petrography of sedimentary rocks of oil and gas bearing regions of Kazakhstan	1	PD, CCH	5	150	15/15/15	105	C								5			
GEO624	Methods of laboratory research of organic matter, oil and gas	1	PD, CCH	5	150	15/15/15	105	C									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	30	30	30	30

		60	60	60	60	
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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	98	15	113
PD	Cycle of profile disciplines	0	53	10	63
Total for theoretical training:		51	151	30	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 28.11.2024

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

Zhanagaliyeva A. S.

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

Aayeldun Y. .

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

Akpanbayev R. C.

Representative of the Academic Committee from Employers
Acknowledged

Paragubov T. 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"