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

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

EDUCATIONAL PROGRAM
6B05207 Geology of combustible minerals

cipher and name of the educational program

Code and classification of the field of education: 6B05
Code and classification of training areas: 6B052 Environment
Group of educational programs: Natural Sciences, Mathematics and Statistics
NRK Level: 6
ORC Level: 6
Duration of training: 4
Volume of credits: 240

Almaty, 2023

The educational program "Geology of combustible minerals" was approved at the meeting of the Scientific Council of KazNITU named after K.I.Satpayev.

Protocol № 11 from « 24 » 02 2023 y.

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

Protocol № 4 from «10» 01 2023 y.

The educational program "Geology of combustible minerals" was developed by the academic committee in the direction of «_____»

Full name	Academic degree/ academic title	Post	Place of work	Signature
Chairman of the Academic Committee:				
Abilkhasimov Khairly Babashevich	Doctor of Geological and Mineralogical Sciences	General manager	GEO-Munai XXI Scientific and Production Center LLP,	
Teaching staff:				
Ensepbayev Talgat Ablaevich	Candidate of Geological and Mineralogical Sciences, Doctor of Geological Sciences (PhD), Associate Professor	Head of the Department "Hydrogeology, Engineering and Oil and Gas Geology"	NAO "Kazakh National Research Technical University named after K.I.Satpayev",	
Auelkhan Yergali Satyshuly	Candidate of Technical Sciences	Associate Professor	NAO "K.I.Satpayev Kazakh National Research Technical University",	
Zavaley Vyacheslav Alekseevich	Candidate of Geological and Mineralogical Sciences	Professor	NAO "K.I.Satpayev Kazakh National Research Technical University",	
Uzbekaliev Rizakhan Khalelovich	Candidate of Geological and Mineralogical Sciences	Senior Lecturer	NAO "K.I.Satpayev Kazakh National Research Technical University	
Employers:				

Absametov Malis Kudysovich	Doctor of Geological and Mineralogical Sciences	Director	LLP "Institute of Hydrogeology and Geoecology named after U.M.Akhmedsafin",	
Murtazin Ermek Zhamshitovich	Candidate of Geological and Mineralogical Sciences	Deputy Director for Science	LLP "Institute of Hydrogeology and Geoecology named after U.M.Akhmedsafin",	
Students				
Zakenova Zarina Sembigalievna		3rd year student	NAO "Kazakh National Research Technical University named after K.I.Satpayev"	

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List of abbreviations and designations

BD – basic disciplines
GOSO – the state compulsory standard of education
DP – documented procedure
UNT – unified national testing
IC – individual curriculum
CTT – credit training technology
CED – catalog of elective disciplines
MEP – modular educational program
RW– research work
R&IA - research and innovation activities
RWS – research work of students
GED – general education disciplines
EP – educational program
PD – profile disciplines
PC – personal computer
TS – teaching staff
RK – Republic of Kazakhstan
WC – working curriculum
QMS – quality management system
IWS – independent work of students
IWSUGT– independent work of students under the guidance of a teacher
SC – standard curriculum
TSS – training and support staff
EMCD – educational and methodical complex of disciplines
EMC – educational and methodological council
EMW – educational and methodical work
EEM – electronic educational materials

1. Description of the educational program

Educational Program (hereinafter, EP) is a set of documents developed by the Kazakh National Research Technical University named after K.I.Satpayev and approved by the Ministry of Education and Science of the Republic of Kazakhstan. The OP takes into account the needs of the regional labor market, the requirements of government agencies and relevant industry requirements and is based on the state educational standard for higher professional education in the relevant field.

OP defines program educational objectives, learning outcomes of students, necessary conditions, content and technologies for the implementation of the educational process, evaluation and analysis of the quality of students during training and after graduation. The OP includes the curriculum, content of disciplines and learning outcomes and other materials to ensure quality undergraduate education.

Last but not least, the objective of the OP is to establish a common basis of feasibility and necessity of the training program "Geology of Combustibles" for all stakeholders, including the government, state authorities, oil and gas geological 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 Combustible Fossils" at Satbayev University and developed within the framework of the direction of "Earth Science".

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

- The Law of the Republic of Kazakhstan "On Education" with amendments and additions within the framework of legislative changes to increase the independence and autonomy of universities from 04.07.18 № 171-VI.
- Law of the Republic of Kazakhstan "On Amendments and Additions to Some Legislative Acts of the Republic of Kazakhstan on Expansion of Academic and Management Independence of Higher Education Institutions" dated 04.07.18, №171-VI.
- Order of the Minister of Education and Science of the Republic of Kazakhstan from 30.10.18, № 595 "On approval of the Model Rules of activity of educational organizations of the relevant types".
- State obligatory standard of higher education (Annex 7 to the order of the Minister of Education and Science of the Republic of Kazakhstan from 31.10.18 year № 604.
- Decree of the Government of the Republic of Kazakhstan from 19.01.12 y. № 111 "On approval of the Model rules of admission to training in educational organizations implementing educational programs of higher education" with amendments and additions from 14.07.16 y. № 405.
- Resolution of the Government of the Republic of Kazakhstan from 13.08.12 № 1042 "On approval of the Concept of development of the geological industry up to 2030".
- Law on Subsoil and Subsoil Use and Draft Code on Subsoil and Subsoil Use.
- Code of public reporting on the results of geological exploration, mineral resources and reserves KAZRC.

- Concept of the State Geological Exploration Program for 2021-2025, January 31, 2020.
- "National Qualifications Framework", approved by the minutes of March 16, 2016 by the Republican Tripartite Commission on social partnership and regulation of social and labor relations.

2. The purpose and objectives of the educational program

Purpose of the OP: The purpose of the educational program OP 6B05207 "Geology of combustibles" is to train bachelors in the field of geological study, prospecting and exploration, delineation and resource evaluation of combustible deposits, meeting the requirements of modern economy in the field of hydrocarbon sector.

Training in this educational program is aimed at training bachelors in geology, geochemistry and geophysics; design and conduct all types of production and research work on geological maintenance of hydrocarbon deposits; conduct scientific research on individual sections (stages, tasks) of the topic in conjunction with a scientific supervisor; complex experiments and observations in the conditions of field expeditions and business trips; to carry out processing and analysis of the results of geophysical, geological and geochemical, geophysical and geophysical research; to carry out research and analysis of the results of geophysical, geological and geochemical research. Types of labor activity:
– production and technological;
– organizational and managerial;
– experimental research:
– design and analytical

Bachelor in the specialty "Geology of combustible minerals", depending on the type of professional activity, 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-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 instruments;
– keeping records of the work performed and evaluating their economic efficiency;
– preparation of geological maps, diagrams, sections, tables, graphs and other

established reporting according to 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 research and scientific-production field, laboratory and interpretation works;
- planning and organization of scientific and production seminars and conferences;

c) experimental 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 engineering-geological objects based on standard computer-aided design and research packages;
- planning, conducting experiments according to specified methods, mathematical processing and analysis of the results.

d) design and analytical:

- ideas about the origin, composition and properties of oil and gas, chemical transformations of oil and natural gas components;
- conducting a preliminary feasibility study of design calculations;

Objects of the graduate's professional activity:

-prospecting and exploration of minerals, for the analysis of actual and stock materials, for the study of promising 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 units as part of production teams and independently;
- study of the origin and location of deposits of combustible minerals;
-physico-chemical composition, properties, genetic and technological classifications, as well as the practical use of each type of fossil fuel;
- the use of modern methods of analysis of substances of oil, natural gas, solid fuels, mathematical processing of the obtained geological and geochemical information

OP objectives:

- studying the cycle of general education disciplines to provide social and humanitarian education based on the laws of socio-economic development of society, history, modern information technologies, state language, foreign and Russian languages;
- study of 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 specialized disciplines is oriented to the study of key theoretical aspects of geology, oil and gas, as well as operational works on the deposits of combustible minerals.

- study of disciplines that form knowledge skills and abilities of planning and organization of research, design analysis of the results of geophysical, geological, geochemical and engineering-geological works;
- familiarization with technologies and equipment of enterprises during different types of practices.
- acquiring skills of laboratory research, technological calculations, equipment selection and design using modern computer technologies and programs.

3. Requirements to the assessment of learning outcomes of the educational program

Bachelor's degree in the specialty "Geology of combustible minerals":

- Demonstrate communication skills, initiative and psychological readiness for labor activity, including when working in a team, and make managerial and technical decisions.
- Create and develop complex biocomputing software.
- Possess excellent programming skills.
- Be able to develop new algorithms.

The following forms of exams are used as an assessment of learning outcomes: written exam (answers on sheets), practical (open questions, problem solving), research work

Final attestation bachelor defense and completion of the diploma project.4. Passport of the educational program

4. Passport of the educational program

4.1. General information

№	Field name	Note
1	Code and classification of the field of education	6B052
2	Code and classification of training areas	6B052 Environment
3	Group of educational programs	Natural sciences, mathematics and statistics
4	Name of the educational program	Geology of combustible minerals
5	Brief description of the educational program	Geology of combustible minerals is an applied science that studies the deposit of minerals, their structure, composition, conditions of formation and patterns of placement in the bowels of the Earth. The forecast of the distribution, prospecting, evaluation and exploration of mineral deposits is also being 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	training in the field of geology of combustible minerals that meet the requirements of modern high-tech production, capable of implementing and developing operational plans for activities related to the study, evolution of the conditions of formation and patterns of placement of combustible

		minerals (coal, oil, gas, peat, oil shale) of their composition and properties development, design, implementation and management of technological processes in the field of the oil and gas geological sector.
7	Type of OP	production; research; organizational and managerial; production and technological.
8	The level of the NRK:	6
9	ORC Level:	6
10	Distinctive features of the OP The most important feature of the object of study, the geology of combustible minerals, is the search and exploration of oil, gas, and gas condensate fields.	1.Natural science and theoretical and ideological competencies; 2. Socio-personal and civic competencies; 3. General engineering professional competencies; 4. Communicative
11	List of competencies of the educational program:	Natural-scientific and theoretical-ideological competencies; Socio-personal and civic competencies; General engineering professional competencies; Communication and IT virtual competencies;
12	Learning outcomes of the educational program:	1.Freely and effectively assess current economic, political, cultural, environmental, scientific and technological situations. 1. 2. Skillfully carry out calculations and experiments in the field of mineralogy, petrography, geological survey, prospecting and exploration of combustible mineral deposits. 3. Determine the most optimal method of prospecting and exploration for combustible minerals based on general geological, tectonic, lithological, geochemical parameters of prospective zones and areas. 4. Classify combustible minerals depending on chemical composition, physical properties of hydrocarbon and aqueous fluids, filtration-capacity parameters of reservoirs, prospective resources of deposits. 5. Apply modern methods of geological surveying, cartography, modeling at the stages of regional study of the prospective territory and further prospecting and delineating geological works. 6. Use mathematical methods of analysis when performing scientific and applied research in the field of hydrocarbon raw materials. 7. Apply innovative methods of field research on geological outcrops and well drilling for prospecting and exploration of combustible mineral deposits, including the use of modern modeling techniques to estimate recoverable reserves. 8. Apply modern geologic, geophysical, and geochemical techniques to solve geologic problems in prospecting and exploration, and in performing in-process and post-drilling studies. 9. Demonstrate high professional qualities and ethics at various stages of geologic exploration of prospective area,

		while managing production prospecting and exploration tasks. 10.Integrate theory and practice data to solve geological, geodynamic, geochemical problems and calculate hydrocarbon reserves. 11.Analyze the results of geological and hydrodynamic observations and studies of both productive parts of deposits and underlying and delineating groundwater in preparation for development, extraction of combustibles.
13	Form of training	full - time
14	Duration of training	4 years
15	Volume of loans	240
16	Languages of instruction	
17	Academic degree awarded	Bachelor of Science
18	Developer(s) and authors:	Yensepbayev T.A., Uzbekkaliev R.H., Omirzakova E.J. Jarasova T.,S.

4.2. The relationship between the achievability of the formed learning outcomes according to the educational program and academic disciplines

№	Name of the discipline	Brief description of the discipline	Number of credits	Generated learning outcomes (codes)										
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO 10	PO 11
Cycle of general education disciplines/Compulsory component														
1	LNG 108 Foreign Language	To provide students with the opportunity to acquire sufficient knowledge to become more fluent in everyday social and academic settings. Students work on improving pronunciation, vocabulary, and grammar. Develop academic language skills.	5	**V**										
2	LNG 104 Kazakh (Russian)	Language material of the course is selected in such a way that the student, learning the lexical and grammatical minimum, had the opportunity to get acquainted with typical communicative situations and himself in such situations, was able to correctly assess them and choose the appropriate model (strategy) of speech behavior.	5	V										
3	KFK 101-104 Physical Culture	Physical Culture as an academic discipline in the system of higher education is designed to form a harmonious personality, capable of directionally using a variety of means of physical culture, sport and tourism for the preservation and promotion of health, psychophysical preparation and self-preparation for various types of.	2	V										
4	CSE 677 Information and Communication Technology (English)	The course contains a curriculum designed to level students' basic knowledge of information and communication technology. It contains a full range of topics with a predominance of practical data handling, algorithmic and programming skills..	5	V										

5	CSE 677 Information and Communication Technology (English)	The course contains a curriculum designed to level students' basic knowledge of information and communication technology. It contains a full range of topics with a predominance of practical data handling, algorithmic and programming skills.	5	**V**											
6	HUM 132 Philosophy.	«Philosophy is the formation of a holistic worldview that has evolved in the context of the socio-historical and cultural development of humanity. Familiarity with the major paradigms of philosophy teaching and education methodology in the classical and post-classical traditions of philosophy. Philosophy is designed to develop sustainable life orientations, finding the meaning of one's existence as a special form of spiritual production	5	**V**											
7	HUM 120 Module of socio-political knowledge (sociology, political science)/	The aim of the course is political socialization of students of technical university, providing the political aspect of training a highly qualified specialist on the basis of modern world and domestic political thought.	3	**V**											
8	HUM 134 Module of socio-political knowledge (cultural studies, psychology)/	Purpose of the discipline: to familiarize students with new methods of geochemical studies of organic matter in rocks. Summary: The study of the material composition and structure of the void space of rocks - reservoirs and fluid supports of natural reservoirs of oil and gas, the main types of analysis of oil and organic matter used at various stages of prospecting and exploration, during which geochemical information is processed.	5	**V**											
Cycle of general education disciplines/ University component															
9	HUM 136 Fundamentals of anti-corruption culture and law	The course introduces students to the improvement of socio-economic relations of Kazakhstan society, psychological peculiarities of corrupt behavior. Special attention is paid to the formation of anti-corruption culture, legal responsibility for corrupt acts in various spheres. The purpose of studying the discipline "Fundamentals of anti-corruption culture	5	**V**								V			

		and law" is to increase public and individual legal consciousness and legal culture of students, as well as to form a system of knowledge and civic position to counteract corruption as an anti-social phenomenon. Expected results: to realize the values of moral consciousness and follow moral norms in everyday practice; to work on raising the level of moral and legal culture; to use spiritual and moral mechanisms to prevent corruption.												
10	MNG 489 Fundamentals of economics and entrepreneurship /	The discipline studies the basics of economics and entrepreneurship from the point of view of science and law; peculiarities, problematic aspects and development prospects; theory and practices of entrepreneurship as a system of economic and organizational relations of business structures; entrepreneurs' readiness for innovative sensitivity. The discipline reveals the content of entrepreneurial activity, career stages, qualities, competencies and responsibilities of an entrepreneur, theoretical and practical business planning and economic expertise of business ideas, as well as risk analysis of innovative development, implementation of new technologies and technological solutions.	5	**V**								V		
11	PET 519 Fundamentals of scientific research methods	The purpose of the study of academic discipline is to develop students' skills in research activities; to familiarize students with scientific knowledge, readiness and ability to conduct research work. Tasks of the discipline: to contribute to the deepening and consolidation of students' existing theoretical knowledge; to develop practical skills in conducting scientific research, analyzing the results obtained and making recommendations; to improve methodological skills in independent work with sources of information and relevant software and hardware.	5	V				V	V					
12	CHE 656 Ecology and life safety /	The discipline studies the tasks of ecology as a science, ecological terms, laws of functioning of natural systems and aspects of environmental safety in the conditions of labor activity; environmental monitoring and management in the field of its safety; sources of pollution of atmospheric air,	5	V				V	V					

		surface, underground water, soil and ways of solving environmental problems; safety of life activity in the technosphere; emergency situations of natural and anthropogenic character												
Cycle of basic disciplines/University component														
13	MAT 101-102 Math I,II	The 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 taught by the graduate departments. The course sections include elements of linear algebra and analytical geometry, introduction to analysis, 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, physics are considered. Analytical geometry in the plane and in space, differential calculus of functions of one variable, derivative and differentials, study of the behavior of functions, directional derivative and gradient, extremum of a function of several variables.	10		**V**				V					
14	PHY 468 Physics	The course studies 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: mechanics, mechanical harmonic waves, basics of molecular-kinetic theory and thermodynamics, electrostatics, direct current, electromagnetism, geometrical optics, wave properties of light, laws of thermal radiation, photoeffect.	5				**V**				V			V
15	GEN 429 Engineering and computer graphics/	The purpose of the discipline is to study the methods of depicting objects and general rules of drawing, with the application of computer graphics. Brief content: basic principles and geometric modeling approaches and methodologies for the	5					**V**		V				

		development of applications with a graphical interface. Formation of graphic systems for the development of drawings, using 2D and 3D modeling methods.												
16	GEO431 General and historical geology/	The essence and content of the discipline, its scientific and practical importance, methods of studying geological phenomena are studied. The basics of geological time calculation, elements of mineralogy, petrography, paleontology, stratigraphy and tectonics are considered. Special attention is paid to the description of geological activities of atmosphere, ice, groundwater, etc.; processes of diagenesis, metamorphism, volcanism and earthquakes. The basics of the evolution of the organic world, geological history and regularities of the Earth's development, main types of tectonic movements, regularities of development of geosynclines and platforms, and stages of the geological history of the Earth's development in the Precambrian, Paleozoic, Mesozoic and Cenozoic periods are considered.	4			V		**V**		V				
17	GIN 148 Geology of sedimentary basin structures	Purpose of the discipline: to familiarize students with the study of the evolution of different types of sedimentary basins and their structure. Purpose: preliminary forecasting, justification of location, 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 reconstruction of the history of geological development.	5			V		V		V				
18	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 structure on the external shape and physical properties of crystals.	6	V	V	V								

		Conditions of origin of minerals in nature. Physical properties and composition of minerals. Basic laws and physical properties of crystal structure and conditions of their formation												
19	GEO434 Petrography	Purpose of the discipline: Main geologic processes, origin of the most common minerals and rocks, landforms, elementary geologic structures, evaluation of formation conditions, petrographic diagnostic methods. Summary of Content: Classification of igneous, sedimentary, metamorphic, metasomatic rocks, nomenclature and conditions of rock formation and their relationship to mineral deposits; use of petrographic information for restoration of rock formation processes.	5		**V**	V	V							
20	GNE 495 General Chemistry	Purpose: formation of knowledge on fundamental issues of general chemistry and skills of their application in professional activity. Summary of content Laws, theoretical provisions and conclusions, which are the basis of chemical disciplines; properties and relationships of chemical elements, based on the periodic law of D.I.Mendeleev and on modern ideas about the structure of matter; basics of chemical thermodynamics and kinetics; processes in solutions; structure of complex compounds.	5			V	V						V	
21	GEO508 General hydrogeology	The purpose of the discipline is to study the origin, conditions of occurrence, composition and regularity of groundwater movement. The interaction of groundwater with rocks, surface water and the atmosphere is also studied. The scope of this science includes such issues as groundwater dynamics, hydrogeochemistry, groundwater prospecting and exploration, and reclamation and regional hydrogeology. The data of hydrogeology are used, in particular, to solve the issues of water supply, land reclamation and irrigation, environmental consequences of hydro-technical construction (reservoirs, etc.).	5				**V**		V	V				
22	GEO 414	The aim of this course is to provide students with	5			V		V			V			

	Geodesy with the basics of topography	the necessary fundamental knowledge about topographic map, its basic properties, content, modern methods and technologies of creation and use to solve scientific and practical problems. The discipline studies the representation on maps of elements of cartographic content: hydrographic objects, relief, vegetation and soils, communication routes, communications. In the process of construction there are constant checks by geodetic methods of correct installation of building structures in the design position												
23	GEO411 Geophysical methods of prospecting and exploration /	Purpose of the discipline: is a complex of sciences, studying the physical and geological foundations, techniques, processing and interpretation of the results of field, geophysical methods (electrical survey, magnetic survey, gravity survey, seismic survey, radiometry and nuclear geophysics). Summary: considered the physical properties of rocks and character associated with the physical field. Geophysical methods of prospecting and exploration are widely used in solving problems of geological mapping, prospecting and exploration of ore and hydrocarbon deposits.	5		V		V			V				
24	GIO582 General engineering geology	Course objective: acquisition of theoretical knowledge about engineering-geological features and properties of rocks, geological and engineering-geological processes occurring in these rocks, engineering-geological conditions of different territories, the study of which is necessary to predict their changes during economic development.	5					V			V			V
25	GIN135 Estimation of hydrocarbon reserves and resources	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 for extracting HC from the subsurface . Purpose of the discipline: to teach an integrated approach to the study of deposits, structure, phase state of hydrocarbons. Brief content: geological and engineering principles underlying the	5				V			V				

		evaluation of hydrocarbon reserves and resources, classification and characterization of HC reserves and resources, methods of their calculation.												
26	PET406 Well drilling /	Drilling well has the purpose to give an idea of the role of core in geological and oil and gas field operations, the need, possibilities and ways of using the results of comprehensive core research in the forecasting and development of oil and gas fields. The task of the course is to provide the basics of knowledge about the methods of core sampling during drilling (including specialized core: sealed and oriented); about the primary documentation of core material.	5			V				V	V			
27	GEO439 Sedimentology	The aim of the discipline is to study the processes of formation, transport and deposition of sedimentary rocks on Earth. The objectives include analyzing sedimentary structures, textures and composition of rocks, as well as determining the conditions of their formation. The purpose of the discipline is to understand the evolution of the environment, reconstructing depositional environments, climatic and geologic events. The content includes the study of sedimentary processes, classification of rocks, analysis of sedimentary basins and their history	5		V	**V**				V				
28	GEO 610 Lithology	Purpose of the discipline: is to familiarize students with the definition of paleogeographic conditions of formation of sedimentary rocks. Summary: Improvement of methods study of sediments and sedimentary rocks. Study of mineral composition, structures, textures and main types of sedimentary rocks. Study of clastic minerals of sedimentary rocks for correlation of sedimentary strata. Determination of conditions of formation and alteration Sedimentary rocks by authigenic minerals. Clarification of formation conditions, determining facies analysis	5		**V**	V	V			V				
29	GIN 154	Purpose: to form students' fundamental principles	6			V		V		V				

	Evolution of lithospheric plates	of plate tectonics, understanding of the processes that form the lithosphere, plate boundaries, volcanic activity, formation of mountains and sedimentary basins. Purpose of the discipline: to teach the student to identify and analyze geodynamic processes to solve practical problems. Content: Basic principles of plate tectonics, types of plate boundaries, geological processes that form the lithosphere, seismic activity, and geodynamic features of the formation of different types of basins and folded structures.												
30	AAP164 Training practice Practice/	It is intended for obtaining the experience of primary professional activity, thanks to which the students are prepared for the assignment of qualification grades in one or more working professions in the profiles of the relevant programs.	2	V	V						V			
		Cycle of basic disciplines Elective component												
31	GIN141 Geology of combustible mineral deposits	Purpose of the discipline: study of the regularity of the conditions of formation and location of combustible minerals. Objectives: the study of the evolution of natural carbon compounds from living matter to combustible minerals, physical and chemical composition, properties of combustible minerals, ways and mechanisms of transformation of biological systems into geological objects, the main features by which the separation of the initial organic matter for the formation of solid, liquid and gaseous combustible fossils, the stages of transformation of organic matter are determined.	6		V		V				V			
32	GEO 627 Mining ecology	Purpose of the discipline: formation of basic knowledge about the interaction of mining industry and the environment, as well as the study of typical environmental problems of mining production and ways to solve them. Objectives: to familiarize how technological processes function, and show their impact on the environment. Analyze the environmental activities of mining enterprises. To evaluate production as a source of	6	V								V		V

		environmental pollution. To teach methods and techniques of rationing of local emissions and discharges of pollutants.												
33	GEO613 Sedimentary basins of the world and Kazakhstan	Purpose-To study the geologic, geodynamic history of sedimentary basins at the global and regional levels. Objectives include analyzing the structure and composition of sedimentary deposits, studying the evolution of basins and the geological processes that led to the formation of mineral deposits. Assignment is to understand the formation, development of sedimentary basins, and their resource potential. The content includes the study of the main sedimentary basins of the world and Kazakhstan, their geologic history, and the peculiarities of the structure of sedimentary deposits.	5	V		V		V						
34	GEO611 Geostatistics and modeling techniques	Purpose of the discipline: study of the application of mathematical methods in geology and geostatistical techniques for assessing resources and reserves of mineral deposits. Brief content: features of the modern stage of development of computer technologies, the possibilities of application of mathematical methods and features of the use of statistical techniques in solving geological problems. The main theoretical foundations of geostatistics and its application to the analysis of geological exploration.	5					V	V	V				
35	GIN137 Geology, prospecting and exploration of hydrocarbon deposits	Purpose of the discipline: study of the regularity of the conditions of formation and location of combustible minerals. Objectives: the study of the evolution of natural carbon compounds from living matter to combustible minerals, physical and chemical composition, properties of combustible minerals, ways and mechanisms of transformation of biological systems into geological objects, the main features by which the separation of the initial organic matter for the formation of solid, liquid and gaseous combustible fossils, the stages of transformation of organic matter are determined.	4			V	V	V		V				
36	GEO644 Introduction to the specialty	Purpose of the discipline: are the first step in the system of training students of geological	4					V				V		

		specializations such as geological engineers, geologists, geophysicists, hydrogeologists and other specialties. Brief content: initial theoretical skills in the chosen specialty, learn to navigate in the sections of geology of combustible, liquid and solid minerals and understand, analyze the basic concepts and terms of the specialty.													
37	Oil and gas fundamentals	The purpose of the discipline is to form basic knowledge of the oil and gas sector of the industry, the idea of the profession and preparation for the study of general technical disciplines. Objectives: introduction to the basic concepts and concepts of oil and gas engineering; familiarization with the current state of the oil and gas industry in the world and Kazakhstan; with the initial information about the search and exploration of deposits, drilling of wells, design of pipeline and storage facilities.	5				V				V		V	V
Cycle of specialized disciplines /University component															
38	GIN138 Physics of oil reservoirs	Purpose of the discipline: the formation of students' knowledge and skills, the development of competencies in the field of theory and practice. Summary: study of filtration-capacitance, physical-mechanical and thermal properties of rocks, composition and physical and chemical properties of reservoir fluids saturating reservoir rocks, phase transitions of hydrocarbon systems, surface-molecular phenomena occurring in the reservoir, properties of the system oil-gas-water-rock, determining the filtration of reservoir fluids from porous media, reservoir operating modes.	5				V						V	V
39	GIN153 Tectonics and geodynamics of sedimentary basins	The aim is to study the relationship between tectonic processes and the formation of sedimentary basins. Objectives include analyzing the structural features of basins, studying deformations and movements of the Earth's crust, and investigating the influence of tectonics on sedimentary processes. The purpose of the discipline is to understand the evolution of sedimentary basins in the context of geologic and	6			V		V					V	

		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.												
40	GEO619 Modeling of geological processes and oil and gas fields	The aim of the course is to study the basic capabilities of graphic editors, including the Petrel software package. Modeling of oil and gas fields and reservoirs allows solving the tasks of reservoir delineation, reserves assessment, determination of hydrocarbon quality, geological and economic evaluation of fields, preparation of exploration and development projects. As well as the development of hydrocarbon fields is aimed at the most complete recovery of their recoverable reserves at maximum economic profitability	5					V	V	V				V
41	GIN 152 Geology of combustible mineral fields	The purpose of the discipline is to study the conditions of formation, regularities of oil, gas, condensate location, their composition and properties. The purpose of the discipline is aimed at the formation of a systematic approach to the study of geological processes that led to the formation, accumulation, formation of HC deposits. The course outlines the geological processes that led to the formation, accumulation of hydrocarbon deposits, methods of calculating geological, recoverable reserves of hydrocarbon deposits, design and optimization of drilling for further production of hydrocarbons.	5				V				V		V	
42	GEO 472 Engineering geodynamics	The aim of the discipline is to master and acquire practical skills to study the state and dynamics of the upper horizons of the Earth's crust in geotechnical engineering. The objectives of the discipline are the study of geological and zonal conditions of formation and development of geological and engineering-geological processes, characterization of distribution and forms of manifestation of endogenous and exogenous geological processes and their factors and causes of occurrence and mechanism of development of modern processes, methods of their study and prediction and control.	5								V		V	V
43	GIN 140	Purpose of the discipline: is to form an understanding	5									**V**		**V**

	Protection and rational use of subsurface resources	of the need, principles and importance of rational and integrated use of subsoil, based on the results of compliance with applicable rules and regulations, deposits of combustible, liquid and solid minerals. Brief content: qualitative and quantitative environmental and economic assessment of field development and the necessary environmental protection measures, the degree of impact of oil and gas production facilities on the environment.												
44	GIN 142 Geochemistry of combustible minerals	Purpose of the discipline: to form students' understanding of combustible fossils, 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 aimed at acquiring knowledge about the properties, composition of hydrocarbons, generation, accumulation of hydrocarbon fluids and solid combustibles, conservation of deposits, also contains information about organic matter and possible methods of its study.	6			V	V				V			
45	GIP 102 Geophysical well surveys	The purpose of the course is to study the physical foundations of geophysical methods and their practical application in obtaining coreless documentation of oil and gas wells. As a result of training the bachelor will have theoretical knowledge of the distribution of physical fields of different nature, classification of GIS methods, the range of solved geological and technical problems, hardware and methodological complexes, methodology of works, basics of interpretation of GIS data in open hole, operations in wells and control of development.	4			V				V	V			
46	GIN 143 Geology of operated fields	Purpose of the discipline: is the analysis and typification of geological conditions of deposits of combustible minerals for the purposes of their effective industrial development. Summary: Improvement of methods, means, technology and organization of geological study of exploited fields. Improving the efficiency of additional exploration, operational exploration and geological and industrial evaluation of fields in the process of their	5				V						V	V

		development. Mastering of information technologies of search, collection, storage and processing of geological information.													
47	GEO 632 Basics of subsoil use	The purpose of the discipline is to study the legislative base in the field of subsoil use in Kazakhstan. The students will know the peculiarities of licensing of subsoil users' activity and will acquire skills of drawing up documents to the competent authorities. They will be able to solve practical issues of collection, processing, storage of geological information, use of basic information and analytical products in the field of subsoil use, make simple estimates of projects of geological exploration works.	5	V							V	V		
48	GIN 145 Geochemical methods of prospecting for combustible minerals	The aim of the discipline is to obtain an understanding of the theoretical background and practical realization of geochemical methods of prospecting for combustible minerals. Objectives of the discipline to study the principles and methods of geochemical analysis, including mass spectrometry, gas chromatography and other modern methods of analysis. As a result of studying this discipline students acquire the skills and abilities necessary for work in the field of prospecting and exploration of caustobiolites.	6			V	V				V		V	
49	Industrial practice I - II	The purpose of the training practice is to consolidate and deepen the obtained theoretical knowledge (experience in acquiring initial professional skills and abilities); to acquire the necessary skills and abilities in the chosen specialty; to expand the ideas about the future professional activity, to increase the information and communication level of the student, to teach the elements of control and communication.	5		V						V	V		V
Cycle of specialized disciplines Elective component															
50	GEO 625 Petrography Sedimentary rocks of oil and gas bearing regions of Kazakhstan	Purpose of the discipline: to choose an understanding of the composition, structure, conditions of occurrence, classification and patterns of formation of igneous and metamorphic rocks that meet the current level of science and the requirements of geological practice. Brief content: familiarize students with the modern theory of lithology, basic concepts,	5		V	V	V				V			

		classifications, features of chemical and mineral compositions, structure (structure and texture) and genesis of sedimentary formations of rocks and muds.												
51	GEO 624 Laboratory methods for organic matter, oil and gas analysis	Purpose of the discipline: to familiarize students with new methods of geochemical studies of organic matter in rocks. Summary: The study of the material composition and structure of the void space of rocks - reservoirs and fluid supports of natural reservoirs of oil and gas, the main types of analysis of oil and organic matter used at various stages of prospecting and exploration, during which geochemical information is processed.	5			V					V		V	

5. Curriculum of the educational program

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

SATBAYEV UNIVERSITY

APPROVED
Chairman of the Management Board-
Rector of KazNTU named after K.Satpayev
M.M. Begentaev
«27» 02 2023 y.

CURRICULUM
of Educational Program on enrollment for 2023-2024 academic year

Educational program 6B05207- "Geology of fossil fuels."
Group of educational programs 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	English language	GED, RC	10	300	0/0/6	210	E	5	5						
LNG 102-104	Kazakh (Russian) language	GED, RC	10	300	0/0/6	210	E	5	5						
M-2. Module of physical training															
KFK 101-104	Physical Culture	GED, RC	8	240	0/0/8	120	Difcredit	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 136	Fundamentals of Anti-Corruption Culture and Law	GED, CCH/UC	5	150	2/0/1	150	E				5				
MNG 489	Fundamentals of Economics and Entrepreneurship														
PET519	Scientific research methods														
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 468	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															
GEN 429	Engineering and computer graphics	BD, UC	5	150	1/0/2	105	E		5						
GEO519	General and historical geology	BD, UC	4	120	2/1/0*	75	E	4							
GIT148	Geology of sedimentary basin structures	BD, UC	5	150	2/1/0*	105	E		5						
GEO196	Crystallography and mineralogy	BD, UC	6	180	2/2/0*	120	E			6					
GEO434	Petrography	BD, UC	5	150	1/2/0*	105	E				5				
CHE495	General chemistry	BD, UC	5	150	1/1/1*	105	E			5					
GEO508	General hydrogeology	BD, UC	5	150	2/0/1*	105	E					5			
GEO414	Geodesy with the basics of topography	BD, UC	5	150	2/1/0*	105	E					5			
GEO411	Geophysical methods of prospecting and exploration	BD, UC	5	150	2/1/0*	105	E						5		
GEO582	General Engineering Geology	BD, UC	5	150	2/0/1*	105	E							5	
GIN135	Calculation of reserves and resources of hydrocarbon raw materials	BD, UC	5	150	1/2/0*	105	E					5			
PET406	Drilling wells	BD, UC	5	150	2/1/0*	105	E			5					
GEO439	Sedimentology	BD, UC	5	150	2/1/0*	105	E				5				
GEO610	Lithology	BD, UC	5	150	2/1/0*	105	E						6		
GIN141	Geochemistry of prospecting for fossil fuels	BD, CCH	6	150	2/1/1*	105	E								
GEO627	Mining ecology														
GEO613	Sedimentary basins of the world and Kazakhstan	BD, CCH	5	150	2/0/1*	105	E				5				
GEO611	Geostatistics and modeling methods														
GIN137	Geology, prospecting and exploration of hydrocarbon deposits	BD, CCH	4	120	2/0/1*	75	E					4			
GEO644	Introduction to the specialty													5	
PET 520	Fundamentals of oil and gas businessoil and gas fields	BD, UC	5	150	2/0/1*	105	E								6
GIN154	Evolution of lithospheric plates	BD, UC	6	180	2/1/1*	120				2					
AAP164	Educational practice	BD, UC													

CYCLE OF PROFILE DISCIPLINES (PD)																				
M-8. Module of professional activity																				
GIN138	Physics of fossil fuel beds	PD, UC	5	150	1/2/0*	105	E							5						
GIN153	Tectonics and Geodynamics of sedimentary basins	PD, UC	6	180	2/0/2*	75	E							6						
GEO619	Modeling of geological processes and oil and gas fields	PD, UC	5	150	2/0/1*	120	E								5					
GIN152	Field geology of fossil fuel	PD, CCH	5	150	2/1/0*	105	E								5					
GEO472	Engineering geodynamics														5					
GIN140	Protection and rational use of mineral resources	PD, UC	5	150	2/1/0*	105	E						6							
GIN141	Geology of fossil fuel deposits	PD,UC	6	180	2/1/1*	120	E								5					
GHP102	Well logging	PD, UC	4	120	2/0/1*	105	E									5				
GIN143	Geology of exploited deposits	PD, UC	5	150	2/1/0*	105	E									5				
GEO625	Petrography of sedimentary rocks of oil and gas bearing regions of Kazakhstan	PD, CCH	5	150	1/1/1*	105	C										5			
GEO624	Methods of laboratory research of organic matter, oil and gas													5						
GEO443	Fundamentals of subsurface use	BD, UC	5	150	2/0/1*	105	E										6			
GEN145	Geochemical methods of searching for fossil fuels	PD, UC	6	180	2/1/1*	120	E					2								
AAP143	Production practice I	PD, UC												3						
CIV786	Production practice II	PD, UC																		8
M-9. Module of final attestation																				
ECA108	Final examination	FA	8																	
M-10. Module of additional types of training																				
AAP500	Military affairs	ATT	0																	
Total based on UNIVERSITY:								31	29	31	29	30	30	30	30					
								60		60		60		60						

Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			
		required component (RC)	university component (UC)	component of choice (CCH)	Total
GED	Cycle of general education disciplines	51		5	56
BD	Cycle of basic disciplines		98	15	176
PD	Cycle of profile disciplines		53	10	232
	Total for theoretical training:	*51*			8
FA	final attestation	8			240
	TOTAL:	59	0	0	

Decision of the Academic Council of Kazntu named after K.Satpayev. Protocol № 11 от 04 "02" 2023 y.

Decision of the Educational and Methodological Council of Kazntu named after K.Satpayev. Protocol № 4 "10" 01 2023 y.

Decision of the Academic Council of the Institute_____ Protocol № 2 от "21" 10 2022 y.

Vice-Rector for Academic Affairs — Zhautikov A.B.

Director of Geology, petroleum and engineering Institute — Syzdykov A.H.

Department Head of Hydrogeology, engineering and petrole — Yensepbaev T.A.

Specialty Council representative from employers — Zholtaev G.Zh.