Geology and Oil-gas Business Institute named after K. Turyssov
Department of "Geophysics and Seismology"

EDUCATIONAL PROGRAM
7M07105 «Oil and gas and ore geophysics»

Code and classification of the field of education: **7M07 «Engineering, manufacturing and Civil engineering»**
Code and classification of training areas: **7M071 «Engineering and engineering trades»**
Group of educational programs: **M109 «Oil and ore geophysics»**
The level of the NQF:7
The level of the IQF:7
Duration of training: 2 years
Volume of credits: 120

Almaty 2024

Reviewed and recommended for approval at a meeting of the Educational and Methodological Council of NJSC "Kazakh National Research Technical University named after K.I.Satpayev".

Protocol No. 6 of April 19, 2024.

The educational program 6B07201 «Oil and gas and ore geophysics» was approved at the meeting of the Scientific Council of NJSC "Kazakh National Research Technical University named after K.I.Satpayev".

Protocol No. 12 of April 22, 2024.

The educational program 7M07105 «Oil and gas and ore geophysics» was developed by the academic committee in the field of training: 7M071 «Engineering and engineering trades»

Full name	Academic degree/ academic title	Position	Workplace	Signature
Chairman of the academic committee				
Khitrov Dmitry Mikhailovich	Candidate of Technical Sciences	Manager of the company's data processing center	«PGS Kazakhstan LLP»	
Teaching staff:				
Ratov Boranbay Tovbasarovich	Doctor of Technical Sciences	Head of the Department of "Geophysics and Seismology"	NJSC "Kazakh National Research Technical University named after K.I.Satpayev"	
Abetov Auez Egemberdyevich	Doctor of Geological and Mineralogical Sciences	Professor	NJSC "Kazakh National Research Technical University named after K.I.Satpayev"	
Umirova Gulzada Kubashevna	Doctor of PhD	Associate Professor	NJSC "Kazakh National Research Technical University named after K.I.Satpayev"	
Togizov Kuanysh Serikkhanovich	Doctor of PhD	Associate Professor	NJSC "Kazakh National Research Technical University named after K.I.Satpayev"	

Muzapparova Akerke Bakbergenovna	Master of Technical Sciences	Teacher	NJSC "Kazakh National Research Technical University named after K.I.Satpayev"	
Employers:				
Kurmanov Baurzhan Koptleuovich	Master of Technical Sciences	General manager	OPTIMUM Design Institute LLP	
Katrenov Zhanibek	Master of Technical Sciences	Senior Geophysicist	Tengizchevroil LLP	
Students				
Ablesenova Zukhra Nigmetzhanova	Master of Technical Sciences	Doctoral student of 1 year of study	NJSC "Kazakh National Research Technical University named after K.I.Satpayev"	

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List of abbreviations and designations

NJSC «KazNRTU named after K.I.Satbayev" – Non-profit joint stock company «Kazakh national research technical university named after K.I. Satbayev»;
NQF – National Qualifications Framework;
Research and development–research work;
U – Universal, social and ethical competencies;
IQF – Industry Qualifications Framework;
PC – professional competencies;
LO – learning outcomes of the educational program;
S – special and managerial competencies;
JSC – joint stock company;
LLP - limited liability partnership;
SIS- student independent study;
EP-educational program;
BD- basic discipline;
PD- profile discipline;
UC- University component;
CC-Component of choice;
FA- final assessment.

1. Description of the educational program

Master's program in EP 7M07105 “Oil and gas and ore geophysics” provides:

- obtaining in-depth theoretical knowledge and practical skills in the field of fundamental research of the Earth's lithosphere, methodologies and methods of conducting onshore and borehole geophysical research in the search and exploration of mineral deposits both in ore provinces and in oil and gas basins;
- formation of general cultural, general scientific, social, informational, professional and pedagogical competencies;
- development of such personal qualities as responsibility, striving for self-development and disclosure of their creative potential among undergraduates,
- knowledge of the culture of thinking, awareness of the social significance of the profession of geophysicist, the ability to make organizational decisions in various situations and willingness to take responsibility for them.

In addition, the master's program in EP 7M07105 «Oil and gas and ore geophysics» develops in graduates professional competencies that are necessary to solve complex problems and require: the use of in-depth fundamental knowledge; abstract thinking and originality of analysis; go beyond the issues covered by standards and practice; development of atypical solutions for complex geological design problems; adaptation to new situations, reassessment of accumulated experience, creation of new knowledge based on geophysical research; setting innovative professional tasks in the field of research and production activities; finding optimal solutions to geological problems, taking into account their validity, cost, information, social and economic security; solving management tasks in the conditions of actual production structures.

EP 7M07105 «Oil and gas and ore geophysics» provides:

a) training of highly qualified specialists in the field of geophysical methods of prospecting and exploration of mineral deposits;

b) obtaining high-quality and professional knowledge on the stages and rational complexes of geological and geophysical research, organization and conduct of field and borehole geophysical observations, processing, interpretation and modeling of the data obtained;

c) acquisition of skills in system analysis of geological and geophysical data, their structuring, classifications of target objects in mineral deposits; setting and solving direct and inverse problems in the search and exploration of mineral deposits.

Professors from leading Universities of the near and far abroad, leading experts from manufacturing companies and research institutes are invited to conduct lectures and consultations on modern problems of geology and geophysics of solid minerals, oil and gas.

Industrial practice is carried out in the following enterprises: «Karachaganak Petroleum Operating B.V.», RGCI «Kazgeinform» LLP, operator and service companies «AK Altynalmas» JSC, «Volkovgeology» JSC, «Kazakhmys Corporation» LLP, «Sezmizbay-U» LLP, «Kazzinc» LLP, «Caspiymunaigas» LLP, «Zhaikmunai» LLP, «Tau-ken Altyn» LLP, «Resources Capital Group», «Geo-

munai XXI» LLP, «VOSTOK Mining Company» LLP, «Altyntau Kokshetau» JSC, RSE on PVC National Nuclear Center of the Republic of Kazakhstan of the Ministry of Energy of the Republic of Kazakhstan, «KMG Engineering» LLP, «Petrel Al» LLP, «GEOKEN» LLP, and others.

Graduates receive a Master's degree and work in oil and gas and mining companies as senior or leading geophysicists, and in research institutes as research assistants.

The professional activities of Masters can be carried out in: academic and departmental research organizations related to solving geological problems; geological exploration and mining companies and companies engaged in prospecting, exploration and extraction of mineral raw materials; organizations monitoring the environment and engaged in solving environmental problems; in secondary and secondary educational institutions. higher professional education.

The following can be attributed to the positive aspects of the profession of graduates of the master's degree in 7M07105 «Oil and Gas and Ore Geophysics»: interesting analytical work, a high salary level, the possibility of career growth, continuing studies in doctoral studies, engaging in research activities, broad diversification of production activities, demand in the labor market, the possibility of employment in foreign companies.

Field of professional activity:

Study of the structure and material composition of the sedimentary cover and lithosphere of the Earth, geophysical prospecting, exploration and forecast of mineral deposits, detailed geological and geophysical study of the structure of oil and gas-bearing areas and specific deposits, ore areas and deposits of solid minerals; ground and borehole geophysical studies at the stage of exploration and additional exploration; geophysical monitoring of the state of geological objects in the exploited mineral deposits.

Objects of professional activity:

Geological bodies in the Earth's lithosphere, mine workings, rocks and mineral resources; accumulations of hydrocarbons and deposits of solid minerals; geophysical fields; natural and man-made geological processes in the areas of exploited mineral deposits, their physico-geological models of formations, sections, in the process of prospecting, exploration and development of deposits of these minerals; geophysical computerized and software-controlled information-measuring and processing systems and complexes.

The subjects of professional activity are:

Studying the structure of the Earth's crust and the physical properties of rocks; conducting scientific research in the field of geoelectric, geomagnetic, seismic, gravitational, geothermal and nuclear ground and aero-geophysical methods, as well as borehole geophysical observations; conducting field observations, processing, interpretation and modeling of the data obtained in the study of geological objects, as well as measures to ensure safety during geophysical works and reduction of their anthropogenic impact on the environment.

Types of professional activity:

Masters in EP 7M07105 "Oil and Gas and Ore Geophysics" are preparing for research and production activities. In accordance with the fundamental and professional training they have received, they can perform the following activities:

a) organizational and managerial activities:

- planning, organization and management of research and scientific-production field, laboratory and interpretive geological and geophysical works;
- development of operational work plans for geophysical parties and detachments;
- selection and justification of scientific, technical and organizational solutions based on geological and geophysical data and economic calculations;
- planning and conducting scientific and production seminars and conferences.

b) research activities:

- independent selection and justification of the goals and objectives of geological and geophysical scientific research;
- independent selection and mastering of methods for solving tasks in the field, laboratory, desk work using modern geophysical equipment, instruments and information technologies;
- analysis and generalization of the results of research works using modern achievements of science and technology, advanced domestic and foreign experience in the field of geophysics and geology;
- evaluation of the results of research geophysical work, preparation of scientific reports, publications, reports, preparation of applications for inventions and discoveries.

c) scientific and production activities:

- preparation and carrying out of production and scientific-production, field, laboratory and interpretation works in solving practical problems of geology and geophysics;
- selection, preparation and professional operation of modern geophysical field and laboratory equipment and instruments;
- collection, analysis and systematization of available (a priori) geological and geophysical information using modern information technologies;
- complex processing, interpretation and modeling of field and laboratory information in order to solve scientific and production problems of geology and geophysics;
- determination of the economic efficiency of scientific and industrial geological and geophysical research;
- participation in the development of regulatory methodological documents in the field of geological and geophysical work.

d) project activities:

- design and implementation of scientific and technical projects in geology and geophysics;
- design of works in the field of rational subsoil use and protection of the geological environment;

- participation in the examination of research projects of geological and geophysical works.

e) scientific and pedagogical activity:

- participation in the preparation and conduct of seminars, laboratory and practical classes;

- participation in the management of scientific and educational work of students of the geophysical specialty.

Areas of professional activity:

With the profile direction: organizational and technological; settlement and design; service and operational; production and technological activities in:

- Ministry of Energy and Ministry of Industry and Infrastructure Development of the Republic of Kazakhstan;

- academic and departmental research organizations related to solving fundamental and applied problems in the oil and gas and mining industries.

- in vertically integrated operator and service companies, in design and survey organizations, conducting geological exploration for prospecting, exploration and additional exploration of mineral deposits, as well as supervising the development of these deposits;

- organizations related to environmental monitoring and solving environmental problems;

At the scientific and pedagogical direction: organizational and managerial; research; educational (pedagogical) activities of various directions in higher, secondary specialized and vocational educational institutions, scientific activities in research institutions, public administration bodies, educational institutions, design organizations, industrial enterprises corresponding to the direction of the profile magistracy.

2. The purpose and objectives of the educational program

EP purpose:

Training of specialists in oil and gas and ore geophysics with an international level of competence capable of solving the most complex problems of prospecting and developing mineral deposits based on innovative methods and technologies of geophysical research (including modern software), using advanced means of recording geophysical potential fields.

EP tasks:

- in-depth theoretical and practical training of undergraduates in oil and gas and ore geophysics, including for conducting pedagogical activities;
- development of the ability to independently expand and deepen knowledge in oil and gas and ore geophysics, the needs and skills of creative mastery of new knowledge in the field of geophysical methods of prospecting and exploration of mineral deposits;
- training of competitive specialists with a high level of professional culture, in demand in the labor market, possessing a set of necessary knowledge and skills, able to formulate and solve modern scientific and practical problems of oil and gas

and ore geophysics, teach at universities, successfully carry out research and management activities;

- training of geophysicists with a high level of professionalism, including a culture of professional communication, capable of performing field work in order to register geophysical data; evaluate their quality; process and interpret the materials obtained; build physical and geological models.
- acquisition of skills in organizing and conducting scientific and applied research, obtaining the necessary knowledge to continue scientific work in doctoral studies.
- obtaining knowledge in the field of university pedagogy and psychology and teaching experience at the university.

3. Requirements for the evaluation of learning outcomes of the educational program

The graduate of EP 7M07105 “Oil and Gas and Ore Geophysics” is awarded an academic master’s degree.

A graduate of the Department of Geophysics in EP 7M07105 “Oil and Gas and ore Geophysics” must:

The graduate of the educational program 7M07105 «Oil and Gas and ore Geophysics» is awarded the academic degree of Master of Engineering and Technology.

A graduate of the Department of Geophysics in the Master's degree program 7M07105 «Oil and Gas and ore Geophysics» must:

- to know and identify the goals and objectives of geophysics in the system of Earth sciences, to find ways to optimally solve the set geophysical tasks;
- be aware of the social significance of his future profession and make every effort to implement the tasks of the organization in which he works;
- have high motivation to perform professional activities, constantly strive to gain new knowledge in fundamental and applied areas of oil and gas and ore geophysics;
- to be able to evaluate the capabilities of each geophysical method for a specific geological situation, to navigate the conditions of applicability of individual methods depending on their resolution;
- have the skills to work with geophysical equipment and geophysical data and have the skills to work with industry software;
- to apply in practice methods of collection, processing, interpretation and modeling of geological and geophysical data;
- be able to synthesize, analyze and summarize information from the stock and published literature, the results of field and laboratory geological and geophysical research;
- participate in the organization of scientific and practical seminars and conferences;
- be ready to work with geophysical data of any complexity, field and laboratory geophysical instruments, and equipment;

- demonstrate the ability to participate as part of the team in the preparation of reports, abstracts, bibliographies on the subject of scientific research, production reports, in the preparation of publications.

As a result of mastering the master's degree program, the graduate should have general cultural, general professional and professional competencies.

A graduate of the Master's degree program of the EP 7M07105 «Oil and Gas and ore Geophysics» must:

have an idea about:

-current trends in the development of the geophysical industry in Kazakhstan and abroad;

-actual methodological and philosophical problems and tasks of oil and gas and ore geophysics;

- the current state of the economic, political, legal, cultural and technological environment of the global business community.

have the ability to:

- abstract thinking, analysis and synthesis of geological and geophysical information; be ready to act in non-standard situations, bear social and ethical responsibility for decisions made, show a desire for self-development, self-realization, use of creative potential;

- independently acquire, comprehend, structure and use new knowledge and skills in professional activity, develop their creative abilities; be able to independently formulate research goals and establish the sequence of solving professional tasks; apply knowledge of fundamental and applied sections of disciplines in practice;

- to perceive diversity and cross-cultural difference, to appreciate diverse approaches to understanding and solving the problems of society.

- to organize cooperation in a team, to show creativity and breadth of interests to solve interdisciplinary problems. A graduate must be tolerant of social, ethnic, confessional and cultural differences, be capable of criticism and self-criticism, have skills of interaction and cooperation, be ready to accept the role of a team leader.

Possess:

-professional competencies (PC) corresponding to the type of professional activity.

-deep systematic knowledge in the field of geophysical methods of prospecting and exploration of mineral deposits.

-the ability to: a) form diagnostic solutions to geophysical problems by integrating fundamental sections of geological sciences and specialized knowledge on geophysical methods of prospecting and exploration of mineral deposits; b) be able to independently conduct research in geophysics, generalize and analyze experimental information, draw conclusions, formulate conclusions and make recommendations.

- economic, social and legal training.

Have skills:

- conducting independent production and research field, laboratory and interpretive geophysical work; professionally operate modern field and laboratory

equipment and instruments.

- submission of proposals and recommendations in oral and written forms.

- preparation and execution of scientific and technical documentation, scientific reports, reviews, reports and articles.

- critically analyze, present, defend, discuss and disseminate the results of their professional activities;

- to use effective methods of processing and interpreting complex information to solve production problems; to create and explore models of the studied objects based on the use of in-depth theoretical and practical knowledge.

To be:

-competent in the search and interpretation of technical information using various search engines (patent search, literary review of magazines and books, the Internet), in the selection and creative use of modern equipment and software to solve scientific and practical problems of oil and gas and ore geophysics;

-socially mobile, be able to adapt to new situations in a professional environment.

In addition, a graduate of the master's program of the OP "Oil and Gas and ore geophysicist"a must:

-to appreciate the traditions of other cultures, their diversity in modern society;

-be ready to communicate orally and in writing in Kazakh, Russian and foreign languages to solve the tasks of professional activity.

-maintain the rules of ethics in society, at work and in interpersonal communication, demonstrate the ability to achieve goals, solve problems in non-standard situations.

-to take care of environmental protection and, by improving skills, to serve the development of the welfare of the whole society.

4. Passport of the educational program

4.1. General information

№	Field name	Comments
1	Code and classification of the field of education	7M07 «Engineering, Manufacturing and Civil engineering»
2	Code and classification of training areas	7M071 «Engineering and engineering trades»
3	Group of educational programs	M109 «Oil and ore geophysics»
4	Name of the educational program	7M07105 «Oil and gas and ore Geophysics»
5	Short description of educational program	It is intended for the implementation of specialized training of masters in EP 7M07105 "Oil and gas and ore geophysics" NPJS KazNRTU named after K.I. Satpayev. It is aimed at providing in-depth theoretical knowledge and practical skills in the field of fundamental research of the Earth's crust, methodologies and methods of conducting onshore and borehole geophysical research in the search and exploration of mineral deposits. A graduate of the department under the master's degree program should know: the goals and objectives of geophysics in the system of Earth sciences; be aware of the

		social significance of his future profession, have high motivation to perform professional activities; be able to assess the capabilities of each geophysical method and navigate in the conditions of applicability of individual methods; have the skills to work with geophysical equipment and geophysical data and have computer skills as a means of information management. Demonstrate the ability to participate as part of a research team in the preparation of reports, abstracts, bibliographies on the subject of scientific research, in the preparation of publications; willingness to work with geophysical data, field and laboratory geophysical instruments, installations and equipment. Apply in practice methods of collection, processing, analysis and generalization of stock, field and laboratory geological and geophysical information (in accordance with the profile of training); participate in the organization of scientific and practical seminars and conferences.
6	EP Purpose	Training of specialists in oil and gas and ore geophysics with an international level of competence capable of solving the most complex problems of prospecting and developing mineral deposits based on innovative methods and technologies of geophysical research (including modern software), using advanced means of recording geophysical potential fields.
7	Type of EP	New EP
8	The level of the NQF	7
9	The level of the IQF	7
10	Distinctive features of the EP	no
11	List of competencies of the educational program:	Universal, social and ethical competencies (U) U1 – understanding and practical use of healthy lifestyle norms, including prevention issues, the ability to use physical culture to optimize performance; U2 – knowledge of the state, Russian and one of the most common foreign languages at a level that ensures human communication; U3 – awareness of the need and acquisition of the ability to independently study and improve their skills throughout their work; U4 – readiness for self-development, self-realization, use of creative potential U5 – the ability to plan and solve problems of their own professional and personal development. U6 – willingness to act in non-standard situations, to bear social and ethical responsibility for the decisions taken; U7 – the ability to abstract thinking, analysis, synthesis. Professional Competencies (PC) PC 1 – the ability to form diagnostic solutions to professional tasks by integrating fundamental sections of geological sciences and specialized knowledge, including about physical processes occurring in the Earth; PC 2 – to know basic and advanced geophysical methods of research (active and passive geophysical measurements of physical fields and equipment and instruments used for them, methods of processing and interpretation of the obtained geophysical data, methods of solving direct and inverse problems of geophysics);

		PC 3 – to know the promising directions of development and problems of oil and gas and ore geophysics, the current level of elaboration of problems; PC 4 – the ability to independently formulate research goals, establish the sequence of solving professional tasks in the areas of oil and gas and ore geophysics; PC 5 – the ability to independently formulate research goals, set specific geophysical tasks and solve them with the help of modern equipment, equipment, software and information technologies using the latest domestic and foreign experience; PC 6 – the ability to independently conduct scientific experiments and research in oil and gas and ore geophysics, generalize and analyze experimental information, draw conclusions, formulate conclusions and recommendations; PC 7 – the ability to create and explore models of the studied objects based on the use of in-depth theoretical and practical knowledge in the field of geology and geophysics; PC 8 – the ability to independently carry out production field, laboratory and interpretation work in solving practical problems of geophysics; PC 9 – be able to independently draw up and submit projects of scientific and production geophysical works, prepare and coordinate geological and geophysical tasks for the development of design solutions. PC 10 – possess the skills of professional operation of modern geophysical field and laboratory equipment (in accordance with professional training); PC 11 – be able to effectively use material and technical support to improve the efficiency of the exploration process. PC 12 – the ability to freely and creatively use modern methods of analysis, processing and interpretation of complex geophysical information to solve scientific and practical problems, including those in related fields of knowledge; PC 13 – possess the skills of systematic logical thinking in the analysis of scientific data and the formulation of practical tasks of geophysical research. PC 14 – identify and systematize PC 16 – own computer software packages designed to work with a complex of geological and geophysical data (Petrel, Focus-Geolog, OazisMontaj, Studio RM, etc.). the main ideas in scientific publications; critically evaluate the effectiveness of various approaches to solving geophysical problems; formulate an independent view of the proposed the problem is taking into account the latest domestic and foreign experience. PC 15 – be able to manage scientific and production work in solving complex problems of geophysics at the stages of design, execution (including processing, analysis and interpretation), preparation of reports and presentation of results. PC 17 – master the basic methods of collecting and analyzing, storing and processing scientific and technical information. PC 18 – to know the methods, safety rules for ensuring the conduct of field and borehole geophysical research.

		PC 18 – the ability to conduct seminars, laboratory and practical classes (within the framework of domestic and international educational programs) in the field of geophysics (in accordance with the specialization) using modern educational technologies (PC-4); PC 19 – the ability to design human protection systems against dangerous and harmful factors in the production of geophysical work based on scientifically sound methods and regulatory documents to ensure safe mining operations when using various technologies for prospecting and exploration of mineral deposits. PC 20 – the ability to analyze and apply the laws on subsoil and subsoil use, industrial safety and environmental code, regularly monitor changes and additions to these laws. PC 21 – skills to conduct marketing research, evaluate logistics, sales market and risks of geophysical work. **Special and managerial competencies (S)** S1 – independent management and control of the processes of labor activity within the framework of the strategy, policy and goals of the organization, discussion of the problem, reasoning of conclusions and competent handling of information; S2– willingness to lead a team in the field of their professional activities, tolerantly perceiving social, ethnic, confessional and cultural differences; S2 – to know and own the main management functions (decision-making, organization, motivation, control) and methods of their implementation; S3 – have organizational skills, be able to create mobile working groups to fulfill their goals and be able to manage such a group, be able to protect their rights and demand that they fulfill their duties. S4 – possess methods and technologies of interpersonal communication, public speaking skills.
12	Results training of the educational program	LO 1: possess systematic and in-depth knowledge of the theory and practice of oil and gas and ore geophysics; LO 2: be able to work with scientific publications to form an independent opinion, taking into account modern domestic and foreign experience; LO 3: understand independently the formulation of the research goal, establish the sequence and methods for solving geophysical problems; LO 4: know modern geophysical equipment and equipment, software and information technologies; LO 5: master the management of scientific and production work in solving complex problems of geophysics at the stages of design, execution, preparation of reports and presentation of results.
13	Form of training	full - time
14	Duration of training	2
15	Volume of loans	120
16	Languages of instruction	Russian/Kazakh
17	Academic degree awarded	Master of Engineering Science
18	Developer(s) and authors:	1). Professor Abetov A.E., 2). Associate professor Umirova G.K.

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

№	Name of the discipline	Brief description of the discipline	Number of credits	Generated learning outcomes (codes)				
				LO1	LO2	LO3	LO4	LO5
Cycle of basic disciplines University component								
1	History and philosophy of science	The subject of philosophy of science, dynamics of science, specifics of science, science and pre-science, antiquity and the formation of theoretical science, the main stages of the historical development of science, features of classical science, non-classical and post-non-classical science, philosophy of mathematics, physics, engineering and technology, specifics of engineering sciences, ethics of science, social and moral responsibility of a scientist and engineer.	3					
2	Foreign language (professional)	The course is designed for undergraduates of technical specialties to improve and develop foreign language communication skills in professional and academic fields. The course introduces students to the general principles of professional and academic intercultural oral and written communication using modern pedagogical technologies.	5	✓	✓			
3	Higher school pedagogy	Undergraduates will master the methodological and theoretical foundations of higher school pedagogy, plan and organize the processes of teaching and upbringing, master the communicative technologies of subject-subject interaction between a teacher and a master in the educational process of a university.	3	✓		✓		
4	Psychology of management	The discipline studies the modern role and content of psychological aspects in managerial activity. The improvement of the psychological literacy of the student in the process of implementing professional activities is considered. Self-improvement in the field of psychology and studying the composition and structure of management activities, both at the local level and abroad. The psychological feature of modern managers is considered.	3					
5	Pedagogical practice	Pedagogical practice is an obligatory component that consolidates the knowledge and skills acquired by undergraduates as a result of mastering theoretical disciplines, develops practical skills and contributes to the formation of universal and general professional competencies.	6			✓		

		The purpose of pedagogical practice is to study the basics of pedagogical and educational–methodical work in universities, mastering the pedagogical skills of conducting training sessions and preparing teaching materials in the disciplines of the educational program "Oil and gas and ore geophysics". The basis of pedagogical practice is the Department of Geophysics of the IGNGD NPJC «KazNRTU named after K.I.Satpayev». The objectives of the practice are to gain experience in teaching work, as well as: - formation of a holistic view of pedagogical activity, pedagogical systems and the structure of higher education; - development of stable skills of practical application of professional and pedagogical knowledge obtained in the process of theoretical training; - development of professional and pedagogical orientation of undergraduates; familiarizing them with real problems and tasks solved in the educational process; studying methods, techniques, technologies of pedagogical activity in higher education; - development of personal and professional qualities of a teacher. The volume of pedagogical practice is 1 credit (15 academies. hours) in the third semester of the EP «Oil and gas and ore geophysics»						
Cycle of basic disciplines Component of choice								
6	Modern nuclear technologies in geophysical research	The course studies the physical foundations of nuclear geophysics and radiometry; the use of nuclear methods in the study of sections of ore, oil and coal wells by qualitative and quantitative interpretation (NGK, NNK-T, NNK-NT), ore and coal (GR, GGDL, GGK-S, PPM, NL, NAL). They study the use of modern nuclear technology in laboratory and field conditions during geophysical research.	5	✓	✓	✓	✓	
7	Nuclear geophysical well logging	The course studies natural radioactivity, neutron and density properties of rocks by well radiometry methods (GR and GGR. GSK), neutron methods (NNA, NGL and INC), nuclear magnetic resonance methods). Features of interpretation of logging diagrams in various types of geological sections, which	5	✓	✓	✓	✓	

		gives direct information about the elemental and radionuclide composition of the studied types of objects of nuclear reaction or the effect of interaction with radiation.						
8	Intellectual property and research	The course is aimed at training specialists who can effectively work with IP, protect the results of scientific research and apply them in practice	5	✓	✓	✓	✓	
9	Complex interpretation of wireline logging data	The course studies the theory and practice of methods of complex interpretation of well geophysical research data , selection of the optimal complex and GIS technology, evaluation of the quality of the materials obtained, interpretation of measurement data; allocation of reservoir layers in the productive thickness according to a complex of geophysical methods of well research; determination of a set of parameters for calculating reserves. A special place is given to the issues of calculating the capacity of the productive horizon, assessing the filtration and capacitance properties of reservoir formations.	5		✓	✓		
10	Geophysical methods sets for different types of mineral deposits	The course studies the basic principles of the formation of geophysical data, equipment and equipment. Modern potential research methods and the choice of a rational geophysical complex are considered. Ability to integrate fundamental and applied sections in geophysical methods. Complex processing and interpretation of materials of electrical exploration, gravity exploration and seismic exploration. Joint solution of direct and inverse problems, creation of physical, geological and petrophysical models based on geophysical data.	5				✓	✓
11	Sustainable development strategies	Graduate students will study the concepts and principles of sustainable development, the development and implementation of sustainable development strategies, the evaluation of their effectiveness, and international standards and best practices. Cases and examples of successful sustainable development strategies are included.	5				✓	✓
12	Geological and geophysical methods of	The course studies the evaluation of the effectiveness of exploration geophysical work, the reliability of the forecast of hydrocarbon deposits, analyzes the effectiveness of methods	5		✓	✓	✓	✓

	prospecting and exploration of oil and gas fields	and data of aerial and ground geophysical surveys, borehole geophysics, modifications of seismic exploration in the search and exploration of oil and gas fields.						
13	Project Management	The course studies the components of project management based on modern behavioral models of project-oriented business development management. The program is based on international standards PMI PMBOK, IPMA ICB and RK standards in the field of project management. The features of organizational management of business development through the interaction of strategic, project and operational management are studied.	5			✓		✓
Cycle of profile disciplines University component								
14	Seismic stratigraphy	The course studies the geological interpretation of seismic data, as well as the solution of structural, structural-formation, stratigraphic, lithofacial, fine and filtrational problems in the search and exploration of mineral deposits. Mastering the basic techniques of seismostratigraphic research. Traps and hydrocarbon deposits of various morphological and genetic types, correlations of sections. The complex of deposits, cycles, sequential stratigraphy, depths of occurrence, fall and strike is considered.	5	✓	✓	✓		✓
15	Research practice	The objectives of the research practice are: - consolidation of skills of scientific or industrial work in oil and gas and ore geophysics; collection of theoretical, laboratory and field material for writing a master's thesis; - formation of skills and abilities in the preparation of scientific and technical reports and public presentations; - practical use of the results of scientific research, including publications, promotion of the results of their own scientific activities; The objectives of the research practice are: - direct participation in research or production work; -acquisition of professional competencies in accordance with the types and tasks of geological exploration;	4		✓	✓		✓

		- involvement of a master's student in a scientific discussion in a creative team, development of public speaking skills; - mastering the technical means of presenting a scientific result. Forms of research practice: field, laboratory, desk. The content of a master's research practice depends on the focus of the task and the topic of the master's thesis. It is directly related to the nature and direction of the scientific activity of the organization in which the undergraduate is practicing. The research practice plan is drawn up individually for each undergraduate and is a program of theoretical, experimental or field work in the field of oil and gas or rune geophysics. This plan provides for: collection of geological and geophysical information on the geological structure of the object of study and geological and geophysical study of the territory; analysis of data on the physical properties of rocks of the studied area; formulation and justification of specific research works; conducting field, experimental or computational work; processing and interpretation of the materials obtained.						
Cycle of profile disciplines Component of choice								
16	Engineering Geophysics	The course studies surface and borehole geophysical methods for solving problems of engineering geology and other applied problems covering the subsurface depths of the Earth's crust. Solutions of engineering and geological problems relevant to human life are the preparation and control of territories for the construction of buildings, roads, structures and other industrial facilities, the physical and geological foundations of the application of methods, methods and techniques for carrying out work and obtaining results. Technical capabilities for solving engineering and geological problems.	5	✓	✓	✓	✓	
17	Engineering and geophysical studies of the environment	The course studies environmental processes and phenomena – landslide processes, karsts, suffusion phenomena. Observations of soil arrays located in the zone of active development, and later in the operation of buildings. Identification of a network of underground utilities and structures. The study of concrete and reinforced concrete structures for the search of deformations and	5	✓	✓	✓	✓	

		identification of weakened zones. Determination of the thickness of man-made bulk soils on the sections of highways.						
18	Integration of geophysical methods in prospecting and exploration of hydrocarbon deposits	The course studies the methodology and theoretical foundations of the integration of geophysical methods in the search for oil and gas fields. The basic concepts, goals, tasks, principles of integration of exploration geophysics methods, selection of typical, rational and optimal geophysical complexes, issues of physical and geological modeling, ambiguity in solving inverse problems of geophysical methods, complex analysis and complex interpretation of geophysical data are considered. Range of tasks and geophysical complexes in solving problems of oil and gas geophysics. Examples of the effective use of the geophysics complex in the search for oil and gas fields.	5	✓	✓	✓	✓	
19	Integration of geophysical methods in prospecting and exploration of deposits of solid minerals	The course discusses the provisions of the methodology for choosing a rational complex, planning, organizing and conducting integrated geophysical surveys at solid mineral deposits (SMT). The range of geological tasks in the search and exploration of solid minerals. Isolation of large, regional structures by the complex of geophysics. Mapping of intrusions, decompaction zones, metamorphism, silicification, folding, etc. using a complex of geophysical methods. Identification of tectonic disturbances of various scales, which are control, supply and distribution channels of ore-bearing brines. Examples of the formation and effectiveness of the geophysics complex in the search for ore objects.	5	✓	✓	✓	✓	
20	Geoinformation systems	The course studies the theory and practice of using geographic information systems (GIS) to support and support research in the field of Earth Sciences. The discipline sections include the following questions: fundamentals of Geoinformatics, methods and technologies for storing and processing information using computer technologies, the use of geoinformation methods and technologies, databases for research in oil and gas and ore Geophysics; methods of work in modern instrumental GIS; preparation for production work with instrumental GIS.	5	✓		✓		

21	Geophysical Informatics	The course in-depth studies the theoretical foundations of cartography (including common world cartographic systems), knowledge of cartographic and aerospace methods in geological and geophysical research; methods of compilation, editing, preparation for publication and publication of thematic maps and atlases in traditional analog and digital forms; interface of geographic information system (GIS), models, data formats, input of spatial data and organization of queries in GIS; software tools for the preparation of cartographic materials.	5	✓			✓	
22	Remote sensing	The purpose of studying the discipline is to obtain deep and comprehensive knowledge about remote sensing of the earth (remote sensing), its practical implementation and visualization tools for solving geological problems. - to study the basics of image construction using electromagnetic radiation of the visible and other parts of the spectrum; - consider the hardware and technical implementation of receiving, transmitting and transport systems used to obtain remote sensing data; - to assess the influence of atmospheric and other distortions on the quality of remote sensing; - to study the features of various types of data and their suitability for geological decryption. The discipline is devoted to the study of the physical foundations of remote sensing of the Earth, the methods of surveying used, the technical implementation of the process of remote sensing of the Earth from aviation and satellite transport platforms, decryption technology, the basics of interpretation, thematic decryption and mapping, the use of remote sensing in geological surveying and the search and exploration of minerals.	5	✓			✓	
23	Integration of distance sounding of Earth and Geo informational systems	The course is aimed at obtaining deep and comprehensive knowledge about remote sensing of the earth (remote sensing), its practical implementation and visualization tools for solving geological problems. The basics of image construction using electromagnetic radiation of the visible and other parts of the spectrum will be considered; hardware and technical implementation of receiving, transmitting and transport systems	5	✓			✓	

		used to obtain remote sensing data; the influence of atmospheric and other distortions on the quality of remote sensing						
24	Geological and geophysical methods of prospecting and exploration of ore deposits	The course studies the features of conducting and the possibility of obtaining geological results in ore areas (fields, sites) using ground data (aerogeophysical) and borehole methods. It also includes issues of the choice and effectiveness of these geophysical methods, taking into account the peculiarities of the geological structure of ore media. The objects of study are the geophysical fields of ore-bearing objects of different genetic types and the principles of their interpretation.	5	✓	✓	✓	✓	
25	Geophysical studies of uranium deposits	The course studies the relationship of the geological characteristics of the section with their physical properties studied during geophysical studies of ore wells; their use in the complex interpretation of diagrams in order to study well sections, identify ore intervals, and assess the quality of minerals. In combination with the data of laboratory studies of the core – the physical properties, the composition of the section and the parameters of ore bodies, the allocation of the main interpretative characteristics of the geological section.	5	✓	✓	✓	✓	
26	Deep modeling based on geophysical data	The course studies various methods of building a deep field model, modern software, principles of building a model based on a priori data. The following issues are considered: the general methodology for constructing deep geological and geophysical models of the field. existing software. Data for building a model; coordinate transformation and import of wells, stratigraphic markers and geophysical data. Well correlation. Visualization and complex interpretation of geophysical data. Fault modeling. Deep transformation. The use of depth models in the calculation of mineral reserves.	4	✓	✓	✓	✓	
27	Geophysical studies of ore and hydrogeological wells	The course studies the theory of GIS methods and understanding the main provisions of their practical implementation in solving geological problems. Complexes of geophysical methods and techniques for the study of ore and hydrogeological wells. The possibilities of GIS methods in solving specific geological	5	✓	✓	✓	✓	

		problems for various types of ore deposits. Reusable application of GIS methods in solving hydrogeological problems, rare metal ores, and uranium deposits.						
28	Special course of the ore and petroleum geophysics	The course studies the theory and practice of geophysical innovative technologies for solving problems of ore and oilfield geology. Examines the features of the application of geophysical methods in oil and gas and ore geophysics; physical and geological foundations and methodology of geophysical methods in solving geological and prospecting problems of complex environments of ore areas; principles of construction of digital three-dimensional geological and technological models, the correct performance of geophysical work.	5	✓	✓	✓	✓	
29	Geophysical control over the development of mineral deposits	The course is based on the study of the conceptual foundations of geophysical methods of control over the development of mineral deposits in complicated conditions, familiarization with the systems and technologies of field development, planning and implementation of the basic principles of development, design and regulation of field development, geophysical methods of control over the development of deposits, basic methods for calculating technological indicators of development taking into account the results of geophysical work.	5	✓	✓	✓	✓	
30	Monitoring the development of solid mineral deposits	The course studies the monitoring of the state of environments (geologically subsurface) and related to them other components of the natural environment within the boundaries of man-made interaction in the process of geological study and development of these deposits; assigned to assess the current structure of the fields being developed and design changes in this state, accounting for the state of subsurface areas for subsurface use objects associated with the extraction of solid minerals.	5	✓	✓	✓	✓	
31	Petrophysical foundations of complex interpretation of GIS data	The aim of the course is to gain knowledge and skills in the complex interpretation of well logging data. The course considers the following issues: mathematical models of petrophysical relationships, reservoir porosity model; reservoir specific apparent electrical resistance model; model of the	4	✓	✓	✓	✓	

		method of own polarization of the productive horizon; model of natural radioactivity of HA; porosity models based on neutron, acoustic and density logging data. Application of the obtained dependencies in the complex interpretation of well logging data.						
32	Modeling of the geological environment based on geophysical data	The course studies the basics of modeling geological environments based on geophysical data. Types of modeling, the main components of modeling: object, parameters and characteristics of this object, the process and results of modeling; principles of constructing quantitative physical and geological models (FGM) when solving mapping, prospecting and exploration geological problems in various regions of the Earth; features of modern methods of constructing three-dimensional digital geological models; accumulated experience of two-dimensional geological modeling for solving practical problems.	5	✓	✓	✓	✓	
33	Technology of computer processing of seismic data	The course studies new approaches to improving the existing seismic service and creating new optimal and authorized production systems; collection, processing and storage of seismometric information. Transition from analog to digital information; creation of a flexible and reliable system with complex mathematical support; state of research and prospects for automation of seismometric studies; automated seismic analysis system; processing of instrumental observations; programs for determining the coordinates of epicenters.	5	✓			✓	

5. Curriculum of the educational program

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

SATBAYEV UNIVERSITY

APPROVED
Chairman of the Management Board-
Rector of Kazpatu named after K.Satpayev
M.M. Begentaev
2024 y.

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

Educational program 7M07105 - "Oil and gas and ore geophysics"
Group of educational programs M109 - "Petroleum and ore geophysics"

Form of study: full-time **Duration of study: 2 year** **Academic degree:Master of Technical Sciences**

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		2 course	
								1 semester	2 semester	3 semester	4 semester
CYCLE OF BASIC DISCIPLINES (BD)											
M-1. Module of basic training (university component)											
LNG213	Foreign language (professional)	BD UC	3	90	0/0/2	60	E	3			
HUM214	Management Psychology	BD UC	3	90	1/0/1	60	E	3			
HUM212	History and philosophy of science	BD UC	3	90	1/0/1	60	E		3		
HUM213	Higher school pedagogy	BD UC	3	90	1/0/1	60	E		3		
M-2. Module of special geophysical 1											
GPH728	Modern nuclear technologies in geophysical research	BD CCH	5	150	2/0/1	105	E	5			
GPH741	Nuclear-geophysical methods of well research										
MNG781	Intellectual Property and Research										
GPH729	Comprehensive interpretation of GIS materials	BD CCH	5	150	2/0/1	105	E	5			
GPH221	Integration of geophysical methods for various types of MPI										
MNG782	Sustainable development strategies										
GPH731	Geological and geophysical methods of prospecting and exploration of oil and gas fields	BD CCH	5	150	2/0/1	105	E		5		
MNG704	Project management										
CYCLE OF PROFILE DISCIPLINES (PD)											
M-3. Module of professional activity (university component)											
GPH733	Seismic stratigraphy	PD	5	150	2/0/1	105	E		5		
M-4. Module of special geophysical 2											
GPH737	Engineering Geophysics	PD	5	150	2/0/1	105	E	5			
GPH217	Engineering and geophysical studies of the environment										
GPH730	Geoinformation systems	PD	5	150	2/0/1	105	E	5			
GPH201	Geophysical Informatics										
GPH734	Remote sensing of the Earth	PD	5	150	2/0/1	105	E			5	
GPH727	Integration of remote sensing and geoinformation systems										
GPH735	Geological and geophysical methods of prospecting and exploration of ore deposits	PD	5	150	2/0/1	105	E			5	
GPH756	GIS of uranium deposits										
GPH742	Geophysical studies of ore and hydrogeological wells	PD	5	150	2/0/1	105	E		5		
GPH240	Special course of ore and oil and gas geophysics										
GPH744	Geophysical control over the development of mineral deposits	PD	5	150	2/0/1	105	E		5		
GPH712	Monitoring of the development of solid mineral deposits										

GPH736	Modeling of the geological environment based on geophysical data	PD	5	150	2/0/1	105	E			5	
GPH269	Technology of computer processing of seismic data										
GPH764	Integration of geophysical methods in the search and exploration of solid mineral deposits	PD	5	150	2/0/1	105	E			5	
GPH765	Integration of geophysical methods in the search and exploration of hydrocarbon deposits										
GPH757	Petrophysical foundations of complex interpretation of GIS data	PD	4	120	2/0/1	75	E				4
GPH758	Deep modeling based on geophysical data										
M-5. Practice-oriented module											
AAP273	Pedagogical practice	BD UC	8							8	
AAP256	Research practice	PD, CCH	4								4
M-6. Experimental research module											
AAP268	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	4					4			
AAP268	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	4						4		
AAP251	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	2							2	
AAP255	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	14								14
M-7. Module of final attestation											
ECA212	Registration and protection of the master thesis	FA	8								8
	Total based on UNIVERSITY:							30	30	30	30
								60		**60**	

Number of credits for the entire period of study					
Cycle code	**Cycles of disciplines**	**Credits**			
			university component (UC)	**component of choice (CCH)**	**Total**
BD	Cycle of basic disciplines		20	15	35
PD	Cycle of profile disciplines		9	44	53
	Total for theoretical training:	***0***	***29***	***59***	***88***
	RWMS				***24***
FA	Final attestation	8			8
	TOTAL:	**8**	**29**	**59**	**120**

Decision of the Academic Council of Kaznrtu named after K.Satpayev. Protocol № 12 **"** 22 **"** 04 **20** 24 **y.**

Decision of the Educational and Methodological Council of Kaznrtu named after K.Satpayev. Protocol № 6 **"** 19 **"** 04 **20** 24 **y.**

Decision of the Academic Council of the Institute GiNGD. Protocol № 12 **от "** 08 **"** 04 **20** 24 **y.**

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

Institute GiNGD Director — **A.H. Syzdykov**

Head of the Department of Geophysics and Seismology — **B.T. Ratov**

Specialty Council representative from employers — **D.M. Khitrov**