



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

**EDUCATIONAL PROGRAM  
7M07105 Oil and gas and ore Geophysics  
the cipher and the name of the educational program**

**Code and classification of the field of education:** 7M07 Engineering, manufacturing and construction industries

**Code and classification of training areas:** 7M071 Engineering and Engineering

**Group of educational programs:** M109 Petroleum and Ore Geophysics

The level of the NRK:7

ORC Level:7

Duration of study: 2 years




Volume of credits: 120

**Almaty 2022**

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

Protocol No. 4 of January 14, 2020

The educational program 7M07105 Oil and gas and ore Geophysics was developed by the academic committee in the direction 7M071 Engineering and Engineering

Full name	Academic degree/ academic title	Post	Place of work	Signature
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<b>Students</b>				
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### **List of abbreviations and designations**

- UNIVERSITY – higher education institution;  
State – state mandatory standards of education;  
ICT – information and communication technologies;  
KazNITU – Kazakh National Research Technical University;  
MES RK – Ministry of Education and Science of the Republic of Kazakhstan;  
NRK – National Qualifications Framework;  
Research and development–research work;  
O – universal, social and ethical competencies  
ORC – Industry Qualifications Framework;  
PC – professional competencies;  
Teaching staff – teaching staff;  
Russian Academy of Sciences – Republican Academy of Sciences of the Russian Federation;  
RO – learning outcomes of the educational program;  
C – special and managerial competencies.

## 1. Description of the educational program

The Master's degree in the field of training "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 the willingness to take responsibility for them.

In addition, the master's degree in the direction of "Oil and Gas and ore Geophysics" forms graduates with professional competencies that are necessary for solving 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.

The educational program in the field of training "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.

Undergraduates practice at research institutes (Institute of Seismology of the Ministry of Education and Science of the Republic of Kazakhstan, Institute of Geological Sciences named after K. I. Satpayeva, KazNIPImunaygas, operator and service companies KarachaganakPetroleumOperating, Tengizchevroil, Kazgeologiya, PGD Services, DANK, PGS, Geoken SPC, GeoEnergiGroup, TatArka, Kazakstankaspiyshelf, Kazakh Geophysical Company, Batysgeofiz.service", "GIS Company", "Azimut Energiservices", "Kazakhmys", "Alstron" LLP, "Azimut Geology" LLP, "Anega Kazakhstan" LLP, "Volgovgeologiya" JSC -"Geotechnocenter", "GISS" LLP, "DP Ortalyk" LLP, "Zhanrosdrilling" LLP, LLP Izdenis, Karakudukmunai LLP, Karazhanbasmunai JSC, KazGIIZ LLP, Kazakhoilaktyube LLP, Kyzylkum LLP, JSC "Oil Company KOR", JSC "Uzenpromgeofizika", LLP JV "KATKO" JSC "KazMunayGas", JSC "PetroKazakhstan", LLP "BapyMining", JSC "NAC KazAtomProm" KAZ MineralsPLS", JSC "MMC Kazakhaltyn", LLP "GEO ENERGY GROUP", etc.

The best undergraduates can get additional education under the academic mobility program at the Colorado School of Mines (USA), Moscow State University, Tomsk Polytechnic University, Frye University, Lorraine University (Nancy, France), Institute of Mining Engineering and Technology (Beijing, China), AdamMickiewicz University (Poland), University ofWarsaw (Poland),

BergakademieFreiberg (Germany), VrijeUniversiteitBrussel (Belgium), NaturalHistoryMuseum (London, UK) and other universities of the near and far abroad.

Graduates receive a Master's degree in Engineering and Technology and work in oil and gas and mining companies as senior or leading geophysicist, in research institutes as researchers.

The professional activity of Masters of Engineering and Technology can be carried out in: academic and departmental research organizations related to solving geological problems; geological organizations, 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 positive aspects of the profession of graduates of the master's degree in Oil and Gas and ore Geophysics include the following 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:

Study of 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 operations and reduction of their anthropogenic impact on the environment.

Types of professional activity:

Masters in the field of training "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 development of methods for solving tasks during field, laboratory, desk work using modern geophysical equipment, instruments and information technologies;
- analysis and generalization of research results 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 projects of research 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:

In 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;

In 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 profile of the profile magistracy.

**2. The purpose and objectives of the educational program**

**3. The purpose of the OP:**



Training of highly qualified specialists in oil and gas and ore geophysics of international level, capable of solving complex problems of prospecting, exploration and development of mineral deposits based on innovative methods and technologies of geophysical research (including modern software), using advanced means of registration, processing, interpretation and modeling of geophysical potential fields and data of borehole geophysics obtained using rational complex of geological and geophysical methods.

**OP 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 the educational program "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 "Oil and Gas and ore Geophysics" must:

- know and identify the goals and objectives of geophysics in the system of Earth Sciences, 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 OP "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:**

- carrying out 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" 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	Note
1	Code and classification of the field of education	7M07 Engineering, manufacturing and construction industries
2	Code and classification of training areas	Code and classification of training areas: 6B072 Manufacturing and processing industries
3	Group of educational programs	7M71 Engineering and Engineering
4	Name of the educational program	7M07105 Oil and gas and ore Geophysics
5	Brief description of the educational program	It is intended for the implementation of specialized training of masters in the educational program "Oil and gas and ore geophysics" Satbayev University. 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 the applicability of individual methods; have 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	Purpose of the OP	Training of highly qualified specialists in oil and gas and ore geophysics of international level, capable of solving complex problems of prospecting, exploration and development of mineral deposits based on innovative methods and technologies of geophysical research (including modern software), using advanced means of registration, processing, interpretation and modeling of geophysical potential fields and data of borehole geophysics obtained using a rational complex of geological and geophysical methods.
7	Type of OP	New
8	The level of the NRK	7
9	ORC Level	7
10	Distinctive features of the OP	no
11	<p><b>Universal, social and ethical competencies (O)</b>  O1 – understanding and practical use of healthy lifestyle norms, including prevention issues, the ability to use physical culture to optimize performance;  O2 – knowledge of the state, Russian and one of the most common foreign languages at a level that ensures human communication;  O3 – awareness of the need and acquisition of the ability to independently study and improve their skills throughout their work;  O4 – readiness for self-development, self-realization, use of creative potential  O5 – the ability to plan and solve problems of their own professional and personal development.  O6 – willingness to act in non-standard situations, to bear social and ethical responsibility for the decisions taken;  O7 – the ability to abstract thinking, analysis, synthesis.</p> <p><b>Professional Competencies (PC)</b>  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</p>	

	<p>and recommendations;</p> <p>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;</p> <p>PC 8 – the ability to independently carry out production field, laboratory and interpretation work in solving practical problems of geophysics;</p> <p>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.</p> <p>PC 10 – possess the skills of professional operation of modern geophysical field and laboratory equipment (in accordance with professional training);</p> <p>PC 11 – be able to effectively use material and technical support to improve the efficiency of the exploration process.</p> <p>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;</p> <p>PC 13 – possess the skills of systematic logical thinking in the analysis of scientific data and the formulation of practical tasks of geophysical research.</p> <p>PC 14 – to isolate and systematize PC 16 – to own computer software packages designed to work with a complex of geological and geophysical data (Petrel, Focus-Geolog, OasisMontaj, Studio RM, etc.).</p> <p>main ideas in scientific publications; critically evaluate the effectiveness of various approaches to solving geophysical problems; formulate an independent view of the proposed problem taking into account the latest domestic and foreign experience.</p> <p>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.</p> <p>PC 17 – master the basic methods of collecting and analyzing, storing and processing scientific and technical information.</p> <p>PC 18 – to know the methods, safety rules for ensuring the conduct of field and borehole geophysical research.</p> <p>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);</p> <p>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.</p> <p>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.</p> <p>PC 21 – skills to conduct marketing research, evaluate logistics, sales market and risks of geophysical work.</p> <p><b>Special and managerial competencies (C)</b></p> <p>C1 – independent management and control of labor activity processes within the framework of the strategy, policy and goals of the organization, discussion of the problem, reasoning of conclusions and competent handling of information;</p> <p>C2 – willingness to lead a team in the field of their professional activities, tolerantly perceiving social, ethnic, confessional and cultural differences;</p> <p>C2 – to know and own the main management functions (decision-making, organization, motivation, control) and methods of their implementation;</p> <p>C3 – 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.</p> <p>C4 – possess methods and technologies of interpersonal communication, public speaking skills.</p>
12	<p><b>Learning outcomes of the educational program:</b></p> <p>RO 1: possess systematic and in-depth knowledge of the theory and practice of oil and gas and ore geophysics;</p> <p>PO2: be able to work with scientific publications to form an independent opinion taking into account modern domestic and foreign experience;</p> <p>RO 3: to understand independently the formulation of research objectives, to establish the sequence and methods of solving geophysical problems;</p>

	RO4:know modern geophysical equipment and equipment, software and information technologies; RO 5: to master the management of scientific and industrial 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
18	Developer(s) and authors:	's degree Professor A.E. Gabitov.

**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)				
				PO1	PO2	PO3	PO4	PO5
<b>Cycle of basic disciplines University component</b>								
1	History and philosophy of science	<p>The purpose of studying the discipline is the formation of in–depth knowledge on the development of history and philosophy, the place and role of scientific knowledge, models, research and methods of scientific knowledge.</p> <p>Studying the course allows you to reveal the connection between philosophy and science, highlight the philosophical problems of the latter and scientific knowledge, the main stages of the history of science, focus on its philosophy, modern problems of the development of scientific and technical reality.</p>	1/0/1			✓	✓	
2	Foreign language (professional)	<p>The course is designed to develop foreign language communication skills in the professional and academic field.</p> <p>Introduces students to the general principles of professional and academic intercultural oral and conversational communication using modern pedagogical technologies (round table, debates, discussions, analysis of professionally-oriented cases, design).</p> <p>The course ends with a final exam. Undergraduates also need to study independently (MIS).</p>	0/0/3		✓		✓	✓
3	Higher school pedagogy	<p>The course is intended for scientific and pedagogical magistracy of all specialties.</p> <p>As part of the course, undergraduates</p>	1/0/1			✓	✓	✓

		will master the methodological foundations of higher school pedagogy, learn how to use modern pedagogical technologies, plan and organize the processes of teaching and upbringing, master the communicative technologies of subjective interaction between a teacher and a student in the educational process of a university. Undergraduates also study human resource management in higher education institutions.						
4	Management Psychology	The course is designed to study the psychology of management, the psychological impact of management activities. The main objective of the course is to analyze the psychological conditions and features of managerial activity in order to achieve results and quality of work in management. Also, undergraduates study marketing of education, human resource management in research organizations, information and communication technologies in the field of education and management of the educational process in higher education.	1/0/1			✓		✓
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. The purpose of pedagogical practice is to study the basics of pedagogical and educational-methodical work in universities, mastering pedagogical skills of conducting training sessions and preparing	6			✓		✓



		<p>teaching materials in the disciplines of the educational program "Oil and gas and ore geophysics".</p> <p>The basis for conducting pedagogical practice is the Department of Geophysics of the IGNGD KazNITU named after K.I.Satpayev.</p> <p>The objectives of the practice are to gain experience in teaching work, as well as:</p> <ul style="list-style-type: none"> <li>- formation of a holistic view of pedagogical activity, pedagogical systems and the structure of higher education;</li> <li>- development of stable skills of practical application of professional and pedagogical knowledge obtained in the process of theoretical training;</li> <li>- 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;</li> <li>- development of personal and professional qualities of a teacher.</li> </ul> <p>The volume of pedagogical practice is 1 credit (15 academies. hours) in the third semester of the educational program "Oil and gas and ore geophysics"</p>						
<p><b>Cycle of basic disciplines</b> <b>Component of choice</b></p>								
6	Modern nuclear technologies in geophysical research	<p>The course is designed to study 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 a qualitative selection of combinations (NGK, NNK-T, NNK-NT),</p>	2/0/1	✓		✓		✓

		ore and coal (GC, GGK-P, GGK-S, PPM, NK, NAC). Undergraduates also study the use of modern nuclear technologies in laboratory and field conditions during geophysical research.						
7	Nuclear-geophysical methods of well research	The course focuses on the study of measurements of natural emission, neutron and density properties of rocks by well radiometry methods (GC and GGC GSK), neutron methods (NNA, NGC and INC), magnetic resonance measurement methods (NMR). Considers the features of the combination of diagrams in various types of sections, which include the direct concentration of the elemental and radionuclide composition of the studied properties of the nuclear reaction or the effect of interaction with resonances.	2/0/1		✓		✓	✓
8	Comprehensive interpretation of GIS materials	The course studies calibration materials and methods of complex analysis of geophysical research data (GIS), sampling complex and GIS processing technologies, revenue quality assessment, interpretation of measurement data; allocation of reservoir layers in the productive thickness according to a complex of geophysical methods of well research; determination of complex parameters for calculating reserves. A special place is given to the calculation of the capacity of the productive horizon, the assessment of the FES of reservoir layers.	2/0/1	✓		✓		✓
9	Integration of geophysical methods for various types of MPI	The course studies the basics of the formation of geophysical data, equipment and equipment. They study modern potential research methods and the choice	2/1/0		✓		✓	✓

		of the optimal geophysical complex, the features of the integration of fundamental and applied sections in geophysical methods. The course is focused on the complex processing and interpretation of materials of electrical exploration, gravity exploration and seismic exploration, on the joint solution of direct and inverse problems, the construction of physical-geological and petrophysical models based on geophysical data						
10	Geological and geophysical methods of prospecting and exploration of oil and gas fields	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 and data of aerial and ground geophysical surveys, borehole geophysics, modifications of seismic exploration in the search and exploration of oil and gas fields.	2/0/1	✓		✓	✓	
11	Project management	Upon completion of the course, the master's student has knowledge of the main components of project management, with an emphasis on modern behavioral models of project-oriented business development management. The course program is based on the international standards PMI PMBOK, IPMA ICB and national standards of the Republic of Kazakhstan in the field of project management recognized by the business community. The features of organizational management are studied. Systemic practices, methods and procedures are considered, consideration in the innovative activity of bodies with psychological aspects of team building, communication and interaction with	2/0/1			✓		✓

		stakeholders.						
<b>Cycle of profile disciplines University component</b>								
12	Seismic stratigraphy	<p>The course studies the basics of interpretation of seismic data, as well as the solution of structural, structural-formation, stratigraphic, seismic and lithofacial, reservoir and filtration problems in the search and exploration of hydrocarbon deposits.</p> <p>Examines the basic techniques of seismostratigraphic studies, traps and hydrocarbon deposits of various morphological and genetic types, correlation of sections, a complex of deposits, seismocyclites, chronological sequence of stratifications, conditions for the formation and occurrence of oil and gas-selective intervals and objects.</p>	2/0/1	✓		✓	✓	
13	Research practice	<p>The objectives of the research practice are:</p> <ul style="list-style-type: none"> <li>- 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;</li> <li>- formation of skills and abilities in the preparation of scientific and technical reports and public presentations;</li> <li>- practical use of the results of scientific research, including publications, promotion of the results of their own scientific activities;</li> </ul> <p>The objectives of the research practice are:</p> <ul style="list-style-type: none"> <li>- direct participation in research or production work;</li> </ul>	4		✓		✓	✓

		<ul style="list-style-type: none"> <li>- acquisition of professional competencies in accordance with the types and tasks of geological exploration;</li> <li>- involvement of a master's student in a scientific discussion in a creative team, development of public speaking skills;</li> <li>- mastering the technical means of presenting a scientific result.</li> </ul> <p>Forms of research practice: field, laboratory, desk.</p> <p>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.</p> <p>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 mine geophysics.</p> <p>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.</p>						
<b>Cycle of profile disciplines</b> <b>Component of choice</b>								
14	Engineering Geophysics	The course studies surface and borehole geophysical methods for solving problems of engineering geology and other applied	2/0/1			✓	✓	

		<p>problems covering the near-surface part of the Earth's crust.</p> <p>The course focuses on the acquisition of knowledge on the physical and geological fundamentals of the application of engineering geophysics methods, on the methodology and technique of work and obtaining results, on the assessment of technical capabilities for solving engineering and geological problems, which include the preparation and control of territories for the construction of buildings, roads, structures and other industrial facilities.</p>						
15	Engineering and geophysical studies of the environment	<p>The course studies environmental processes and phenomena, landslide processes, karsts, suffusion phenomena. The course is focused on the acquisition of knowledge:</p> <ul style="list-style-type: none"> <li>-based on observations of soil arrays located in the zone of active development, and later in the process of building operation;</li> <li>- identification of a network of underground utilities and structures. The study of concrete and reinforced concrete structures to search for deformations and identify weakened zones.</li> <li>- determination of the thickness of man-made bulk soils on the sections of the passage of highways.</li> </ul>	2/1/0		✓	✓		
16	Geoinformation systems	<p>The course studies the theory and practice of using geoinformation systems (GIS) to support and support and research in the field of Earth sciences.</p> <p>The discipline sections include the following issues: fundamentals of</p>	2/0/1			✓	✓	✓

		geoinformatics, methods and technologies for storing and processing information using computer technology, the use of geoinformation methods and technologies, databases for research in oil and gas and ore geophysics; methods of work in modern instrumental GIS and preparation for production work with them.						
17	Geophysical Informatics	The discipline studies the means and methods of geoinformation analysis for assessing the state of operational thematic mapping, automated monitoring of the environment and economic entities based on the creation and collection of spatial data. The discipline forms basic knowledge on the methodology of obtaining, integrating and analyzing the quality of spatial data (models) in real time using GIS, to analyze and provide effective solutions in geographical research, in design, state and municipal management, economic and social activities of business, population and social	2/1/0			✓	✓	
18	Remote sensing of the Earth	The course studies the features of various types of methods and data of remote sensing of the Earth and their suitability for geological interpretation. The course focuses on the acquisition of knowledge on the physical basics of remote sensing of the Earth, the technical implementation of the filming process from aviation and satellite transport platforms, decryption technology, the basics of interpretation, thematic decryption and mapping, the use of remote sensing in geological surveying, prospecting and	2/0/1	✓		✓		

		exploration of minerals.						
19	Integration of remote sensing and geoinformation systems	<p>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.</p> <p>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 used to obtain remote sensing data; the influence of atmospheric and other distortions on the quality of remote sensing.</p>	2/0/1		✓		✓	
20	Geological and geophysical methods of prospecting and exploration of ore deposits	<p>The course studies the features of conducting and the possibility of obtaining geological results in ore areas (fields, sites) using ground-based, aerogeophysical and borehole methods.</p> <p>The course also includes questions 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.</p>	2/0/1	✓			✓	✓
21	GIS of uranium deposits	<p>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.</p>	2/0/1			✓	✓	✓



		In combination with the data of laboratory core studies, the course is focused on obtaining knowledge on the physical properties, the structure of the geological section and the parameters of ore bodies, on highlighting the main interpretative characteristics of the geological environment						
22	Geophysical studies of ore and hydrogeological wells	<p>The course studies:</p> <ul style="list-style-type: none"> <li>- Theory of GIS methods, understanding the main provisions of their practical implementation in solving geological problems.</li> <li>- Complexes of geophysical methods and techniques for the study of ore and hydrogeological wells.</li> <li>- The possibilities of GIS methods in solving specific geological problems for various types of ore deposits.</li> <li>- Multiphase application of GIS methods in solving hydrogeological problems, rare-metal ores in uranium deposits.</li> </ul>	2/0/1		✓		✓	
23	Special course of ore and oil and gas geophysics	<p>The course studies:</p> <ul style="list-style-type: none"> <li>- Theory and practice of geophysical innovative technologies for solving problems of ore and oilfield geology.</li> <li>- Examines the features of the application of geophysical methods in oil and gas and ore geophysics.</li> <li>- Physico-geological foundations and methodology of geophysical methods in solving geological and problems of complex environments of ore areas;</li> <li>- Principles of construction of digital three-dimensional geological and technological models, correct execution of</li> </ul>	2/1/0	✓			✓	✓

		geophysical works.						
24	Geophysical control over the development of mineral deposits	<p>The course is based on the study of the conceptual foundations of geophysical methods of control over the development of mineral deposits in difficult geological conditions.</p> <p>Introduces the systems and technologies of field development, planning and implementation of the basic principles of development, design and regulation, with geophysical methods of control over development, with the basic methods of calculating technological indicators of development taking into account the results of geophysical work.</p>	2/0/1	✓			✓	
25	Monitoring of the development of solid mineral deposits	<p>The course studies the monitoring of the state of the environment (geological subsurface) and related other components of the natural system within the boundaries of man-made interaction in the process of geological study and development of deposits of solid minerals; examines the structure of the developed deposits and the design of changes in their condition for the objects of subsurface use associated with the extraction of solid minerals.</p>	2/0/1		✓	✓	✓	
26	Modeling of the geological environment based on geophysical data	<p>The course is focused on the acquisition of knowledge on:</p> <ul style="list-style-type: none"> <li>- fundamentals of modeling geological environments based on geophysical data;</li> <li>- types of modeling and its main components: objects, parameters and characteristics of these objects, processes and results of modeling;</li> <li>- the principle of constructing quantitative physico-geological models (FGM) in solving mapping, prospecting</li> </ul>	2/0/1			✓	✓	✓

		<p>and exploration geological problems in various regions of the Earth;</p> <ul style="list-style-type: none"> <li>- features of modern methods of constructing three-dimensional digital geological models;</li> <li>- accumulated experience of two-dimensional geological modeling for solving practical problems.</li> </ul>						
27	Technology of computer processing of seismic data	<p>The course explores new approaches to:</p> <ul style="list-style-type: none"> <li>- improvement of the existing seismic service and creation of new optimal and authorized systems for the production, collection, processing and storage of seismometric information;</li> <li>-transition from analog to digital information;</li> <li>- creation of a flexible and reliable system with complex mathematical support;</li> <li>-the state of research and prospects of automation of seismometric studies;</li> <li>- automated seismic analysis system;</li> <li>- processing of instrumental observations;</li> <li>- to programs for determining the coordinates of earthquake epicenters.</li> </ul>	2/0/1		✓	✓	✓	
28	Integration of geophysical methods	<p>The course examines the choice of a typical set of methods, the informativeness of individual methods and their various combinations in solving a specific geological problem, as well as the economic indicators of methods, ensuring the choice of a rational complex.</p> <p>The course is focused on the study of economic indicators on the costs of conducting geophysical work, a priori information about the probability/risks of</p>	2/0/1			✓	✓	✓

		allocating the desired object, the possible value of forecast reserves, the costs of checking falsely detected objects, etc.						
29	Integration of geophysical research	<p>The course studies</p> <ul style="list-style-type: none"> <li>--Methodological and applied foundations of the integration of geophysical methods.</li> <li>- Methods of solving the set geological task in the search and exploration of mineral deposits.</li> <li>- Principles of integration of various methods of applied geophysics.</li> <li>- Physical and geological modeling by a complex of geophysical methods.</li> </ul> <p>The course is focused on the acquisition of knowledge on complex analysis and interpretation of geological and geophysical data; selection of typical, rational and optimal geophysical complexes; application of geophysical complexes in the search and exploration of minerals, solving engineering and environmental problems.</p>	2/0/1		✓		✓	

**5. Curriculum of the educational program**  
**KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I.SATPAYEV**



**APPROVED**  
**Chairman of the Management Board-**  
**Rector of Kazntu named after**  
**K.Satpayev**  
\_\_\_\_\_ **M.M. Begentaev**  
« \_\_\_\_ » \_\_\_\_\_ **2022 y.**

**CURRICULUM**  
**of Educational Program on enrollment for 2022-2023 academic year**  
**Educational program 7M07105 - "Oil and gas and ore geophysics"**  
**Group of educational programs 7M71 Engineering and Engineering**

**Form of study: full-time      Duration of study: 2 year      Academic degree: Master of Engineering and Technology**

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			
								1 semester	2 semester	3 semester	4 semester
<b>CYCLE OF BASIC DISCIPLINES (BD)</b>											
<b>M-1. Module of basic training (university component)</b>											
LNG210	English (professional)	BD UC	5	150	0/0/3	105	E	5			
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			
<b>M-2. Module of special geophysical 1</b>											
GPH728	Modern nuclear technologies in geophysical research	BD CCH	5	150	2/0/1	105	Э	5			

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имени К.И. САТПАЕВА»

GPH741	Nuclear-geophysical methods of well research										
GPH729	Comprehensive interpretation of GIS materials	BD CCH	5	150	2/0/1	105	Ә	5			
GPH221	Integration of geophysical methods for various types of MPI				2/1/0						
GPH731	Geological and geophysical methods of prospecting and exploration of oil and gas fields	BD CCH	5	150	2/0/1	105	Ә		5		
MNG704	Project management										
<b>CYCLE OF PROFILE DISCIPLINES (PD)</b>											
<b>M-3. Module of special geophysical 2</b>											
GPH733	Seismic stratigraphy	PD UC	5	150	2/0/1	105	Ә		5		
GPH737	Engineering Geophysics	PD CCH	5	150	2/0/1	105	Ә			5	
GPH217	Engineering and geophysical studies of the environment				2/1/0						
GPH730	Geoinformation systems	PD CCH	5	150	2/0/1	105	Ә	5			
GPH201	Geophysical Informatics				2/1/0						
GPH734	Remote sensing of the Earth	PD CCH	5	150	2/0/1	105	Ә			5	
GPH727	Integration of remote sensing and geoinformation systems										
GPH735	Geological and geophysical methods of prospecting and exploration of ore deposits	PD CCH	5	150	2/0/1	105	Ә			5	
GPH756	GIS of uranium deposits										

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имени К.И. САТПАЕВА»

GPH742	Geophysical studies of ore and hydrogeological wells	PD CCH	5	150	2/0/1	105	Э		5		
GPH240	Special course of ore and oil and gas geophysics				2/1/0						
GPH744	Geophysical control over the development of mineral deposits	PD CCH	5	150	2/0/1	105	Э		5		
GPH712	Monitoring of the development of solid mineral deposits										
GPH736	Modeling of the geological environment based on geophysical data	PD CCH	5	150	2/0/1	105	Э			5	
GPH269	Technology of computer processing of seismic data										
GPH738	Integration of geophysical methods	PD CCH	5	150	2/0/1	105	Э			5	
GPH726	Integration of geophysical research										
<b>M-4. Practice-oriented module</b>											
AAP229	Pedagogical practice	BD UC	6						6		
AAP256	Research practice	PD, CCH	4								4
<b>M-5. Experimental research module</b>											

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имени К.И. САТПАЕВА»

AAP251	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	2					2			
AAP241	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	3						3		
AAP254	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	5							5	
AAP255	Research work of a master's student, including internship and completion of a master's thesis	RWMS UC	14								14
<b>M-6. Module of final attestation</b>											
ECA205	Preparation and defense of a master's thesis	FA	12								12
	<b>Total based on UNIVERSITY:</b>							25	35	30	30
								<b>60</b>		<b>60</b>	



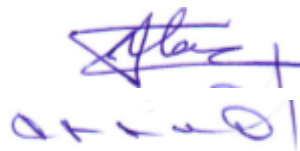
Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			
		required component (OK)	university component (VC)	component of choice (KV)	Total
OOD	Cycle of general education disciplines	51		5	56
DB	Cycle of basic disciplines		82	30	112
PD	Cycle of profile disciplines		24	36	60
	<b>Total for theoretical training:</b>	<b>51</b>	<b>106</b>	<b>71</b>	<b>228</b>
FA	Final certification	12			12
	<b>TOTAL:</b>	<b>63</b>	<b>106</b>	<b>71</b>	<b>240</b>

Decision of the Academic Council of Kazntu named after K.Satpayev. Protocol № 13 of «28» 04 2022 г.

Decision of the Educational and Methodological Council of Kazntu named after K.Satpayev. Protocol № 7 of «26» 04 2022 г.

Decision of the Academic Council of the Institute. Protocol № 4 of «30» 12 2021 г.

Vice-Rector for Academic Affairs



B.A. Zhautikov

Institute Director

A.H. Syzdykov

Department Head Geophysics



A.E. Abetov

Specialty Council representative from employers



D.M. Khitrov