



K. Turysoff Institute of Geology, Oil, and Gas Industry

**Department of Geological Survey,
Prospecting and Exploration of Mineral Deposits**

EDUCATIONAL PROGRAM

7M07206 "GEOLOGY AND EXPLORATION OF SOLID MINERAL DEPOSITS"

Code and classification of the field of education: 7M07-Engineering, manufacturing, and construction sectors

Code and classification of training directions: 7M072-Manufacturing and processing sectors

Group of educational programs: M121-Geology

Level based on NQF: 7

Level based on IQF: 7

Study period: 2 years

Amount of credits: 120 credits

Almaty 2025

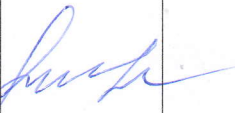
Educational program 7M07206-"Geology and exploration of solid mineral deposits"
Was approved at the meeting of K.I. Satbayev KazNRTU Academic Council

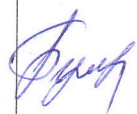
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Educational program 7M07206-"Geology and exploration of solid mineral deposits"
was developed by Academic committee based on direction «7M072-Manufacturing
and processing sectors »

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List of abbreviations and designations

NQF	The National Qualifications Framework
BC	Basic competencies
PC	Professional competencies
UNT	Unified national testing
CTE	credit technology of education
RD	required component
CGES	the cycle of general education subjects
PD	profile disciplines
ECTAS	The European Credit Transfer and Accumulation System
AS	academic staff
EP	Educational Program
TSS	training and support staff
CES	catalog of elective subjects
SMSE	The State mandatory standard of education
LO	learning outcome
SRW	scientific research work
MSRW	Master's student's research work
GIS	geological information system
SDGs	Sustainable Development Goals

1. Description of educational program

The educational program is designed to provide scientific and pedagogical training for master's degree students under the educational program "Geology and Exploration of Solid Mineral Deposits" at Satbayev University. It has been developed within the framework of the "Manufacturing and Processing Industries" direction.

At the master's level, training in the specialty "Geology and Exploration of Solid Mineral Deposits" is carried out through trajectories aimed at implementing educational programs for training personnel in the geological sector, possessing advanced technical-analytical, scientific-pedagogical, and forecasting skills.

Types of professional activity:

- Research and development;
- Research and production;
- Project-based;
- Organizational and managerial;
- Scientific and pedagogical.

A Master's degree in the specialty "Geology and Exploration of Solid Mineral Deposits" is prepared to solve the following professional tasks, depending on the type of professional activity:

a. Research and Development Activity:

- Independent selection and justification of the goals and objectives of scientific research;
- Independent selection and mastery of methods for solving the set tasks during field, laboratory, and interpretative studies using modern equipment, instruments, and information technologies (in accordance with the focus of the master's program);
- Analysis and generalization of the results of scientific research using the latest achievements in science and technology, as well as advanced domestic and international experience;
- Evaluation of the results of scientific research, preparation of scientific reports, publications, presentations, and preparation of applications for inventions and discoveries.

b. Research and Production Activity:

- Independent preparation and conduct of production and research-production field, laboratory, and interpretative studies to solve practical tasks (in accordance with the focus of the master's program);
- Independent selection, preparation, and professional operation of modern field and laboratory equipment and instruments (in accordance with the focus of the master's program);
- Collection, analysis, and systematization of specialized information using modern information technologies;
- Comprehensive processing and interpretation of field and laboratory data to solve research-production tasks;
- Determination of the economic efficiency of research-production activities.

c. Project Activity:

- Design and implementation of scientific and technical projects;
- Participation in the expert evaluation of research and research-production project works;
- Participation in the development of regulatory and methodological documents in the field of geological work.

d. Organizational and Managerial Activity:

- Planning and organization of scientific research and research-production field, laboratory, and interpretative work;
- Planning and organization of scientific and research-production seminars and conferences;

e. Scientific and Pedagogical Activity:

- Participation in the preparation and conduct of seminar, laboratory, and practical classes, as well as field practices;
- Participation in supervising the scientific and educational work of students in the field of geology.

3. Objects of Professional Activity of the Graduate:

- The Earth, Earth's crust, lithosphere, rocks, solid mineral deposits;
- Physical properties of rocks;
- Minerals, crystals, geochemical fields and processes;
- Geological environment, natural and technogenic geological processes; ecological functions of the lithosphere.

The duration of the master's program is determined by the volume of academic credits earned. Upon completion of the required volume of academic credits and achieving the expected learning outcomes for obtaining a master's degree, the educational program is considered fully completed. In the scientific-pedagogical master's program, no less than 120 academic credits must be earned throughout the course of study, including all types of academic and research activities of the student.

The planning of the educational content, the method of organizing and conducting the learning process, is carried out independently by the university and the research organization based on the credit-based learning technology.

The master's program in the scientific-pedagogical direction implements postgraduate educational programs for the training of scientific and scientific-pedagogical personnel for universities and research organizations, possessing advanced scientific-pedagogical and research training.

The content of the master's educational program consists of:

- 1) theoretical training, including the study of core and specialized courses;
- 2) practical training of master's students: various types of practices, scientific or professional internships;
- 3) research work, including the completion of the master's thesis – for the scientific-pedagogical master's program;
- 4) final certification.

The content of the educational program "Geology and Exploration of Solid Mineral Deposits," based on the development of a multi-level system for training specialists, the fundamentals and quality of education, continuity and consistency of

education and science, and the unity of education, upbringing, research, and innovation, is aimed at maximizing the satisfaction of consumer demands and should ensure:

The acquisition of comprehensive and high-quality professional and scientific-pedagogical education in the field of geology of solid mineral deposits (SMD), confirmed by the level of knowledge, skills, and competencies, both in terms of content and volume, as well as their assessment;

The preparation of master's students for the geological industry, with knowledge of the technology, organization, and economics of the geological sector, as well as methods and principles for its improvement and design;

The training of professional and competitive specialists in the field of geology, prospecting, and exploration of SMDs;

A high level of theoretical training in sociocultural, economic-legal, and professional disciplines, considering trends in modern scientific-pedagogical and professional public development, with the inclusion of leading domestic and foreign specialists in the field of geological services into the educational process;

A high level of language proficiency;

The development of project-research skills, including the execution of projects aimed at the practical application of modern professional digital methodologies and technologies for organizing the activities of geological production enterprises, research, and educational organizations;

An optimal balance between theoretical and practical training in the educational process (achieved through targeted organization of research and production internships);

A student-centered approach to the educational process, aimed at developing a responsible attitude toward the results of professional activity;

An aspect of self-development, focusing on the organization of professional activities in which the student is oriented toward continuous professional self-improvement.

2. Purpose and objectives of educational program

Purpose of EP: The purpose of the educational program is to prepare masters in the field of geology and exploration of solid mineral deposits, which meets the requirements of modern high-tech production, able to carry out design and production and technological activities in this area at a high technical and scientific level, engage in organizational and managerial activities in the public and private sectors, at geological exploration, mining enterprises, the nuclear industry, work in design, education and research organizations of any form of ownership

Tasks of EP:

- The readiness of specialists for research and project work in the field of exploration, development, and operation of solid mineral deposits.
- Training of specialists capable of implementing and operating innovative geological technologies at the local level to promote sustainable industry development, modernize infrastructure, and enhance the technological potential of the mining and geological sector (SDG 9).
- The readiness of specialists to search for and acquire new information necessary to solve professional tasks in the field of knowledge integration relevant to their area of activity, and to actively participate in the activities of an enterprise or organization.
- The readiness of specialists for scientific-information, ideological, and problem-oriented communications in a professional environment and with non-specialist audiences, clearly and deeply justifying their position, engaging in organizational, managerial, and service activities, and understanding the responsibility for their professional decisions.
- The readiness of specialists for self-learning and continuous professional development throughout their scientific or professional careers.

3. Requirements for evaluating the educational program learning outcomes

The previous level of education for applicants is higher professional education (bachelor's degree). The candidate must have a diploma of the established form and confirm their level of English proficiency with a certificate or diploma of the established form.

The admission procedure for citizens to the master's program is established in accordance with the "Model Rules for Admission to Educational Organizations Implementing Postgraduate Education Programs."

The formation of the master's student contingent is carried out through the placement of a state educational order for the training of scientific and pedagogical personnel, as well as through payment for education from the citizens' own funds and other sources. Citizens of the Republic of Kazakhstan are granted the right to receive free postgraduate education on a competitive basis in accordance with the state educational order, if it is their first time pursuing education at this level.

At the "entry point," a master's student must have all the prerequisites necessary for mastering the corresponding master's educational program. The list of required prerequisites is determined independently by the higher educational institution.

If the necessary prerequisites are not met, the master's student may be allowed to acquire them on a paid basis.

Awarded qualification degree:

The graduate of this educational program is awarded the academic degree of "Master of Technical Sciences" in the field of "Manufacturing and Processing Industries" with a specialization in "Geology and Exploration of Solid Mineral Deposits."

A graduate who has completed the master's program should possess the following general professional competencies:

- The ability to independently acquire, understand, structure, and apply new knowledge and skills in professional activities, as well as to develop innovative capabilities;
- The ability to independently formulate research objectives and establish the sequence for solving professional tasks;
- The ability to apply in practice the knowledge of fundamental and applied areas of disciplines that define the focus (profile) of the master's program;
- The ability to professionally select and creatively use modern scientific and technical equipment to solve scientific and practical tasks;
- The ability to critically analyze, present, defend, discuss, and disseminate the results of professional activities;
- Proficiency in drafting and preparing scientific-technical documentation, scientific reports, reviews, presentations, and articles;
- The readiness to lead a team in their professional field, with tolerance for social, ethnic, religious, and cultural differences;
- The readiness to communicate in both oral and written forms in a foreign

language to solve professional tasks.

A graduate who has completed the master's program should possess professional competencies corresponding to the types of professional activities that the master's program is aimed at:

Research Activity:

- The ability to form diagnostic solutions to professional tasks through the integration of fundamental sciences and specialized knowledge obtained during the completion of the master's program;
- The ability to independently conduct scientific experiments and research in the professional field, generalize and analyze experimental information, draw conclusions, and formulate recommendations;
- The ability to create and study models of the objects under investigation based on the use of in-depth theoretical and practical knowledge in the field of geology and exploration of solid mineral deposits.

Research-Production Activity:

- The ability to independently conduct production and research-production field, laboratory, and interpretative work to solve practical tasks;
- The ability to professionally operate modern field and laboratory equipment and instruments within the scope of the master's program;
- The ability to use modern methods for processing and interpreting complex information to solve production tasks.

Project Activity:

- The ability to independently develop and present projects for research and research-production work;
- The readiness to design complex research and research-production work to solve professional tasks.

Organizational and Managerial Activity:

- The readiness to apply practical skills in organizing and managing research and research-production activities to solve professional tasks;
- The readiness to practically apply regulatory documents when planning and organizing research-production work;

Scientific-Pedagogical Activity:

- The ability to conduct seminars, laboratory, and practical classes;
- The ability to participate in supervising the scientific and educational work of students in the field of geology and exploration of solid mineral deposits.

When developing the master's program, all general cultural and general professional competencies, as well as professional competencies related to the types of professional activity that the master's program is aimed at, are included in the set of required outcomes for mastering the program.

4. Passport of educational program

4.1. General information

№	Field name	Comments
1	Code and classification of the field of education	7M07 Engineering, Manufacturing, and Construction Industries.
2	Code and classification of training directions	7M072 Manufacturing and Processing Industries.
3	Educational program group	M121 Geology
4	Educational program name	7M07206 Geology and Exploration of Solid Mineral Deposits
5	Short description of educational program	The educational program is designed to provide scientific and pedagogical training for master's students in the program "Geology and Exploration of Solid Mineral Deposits" at Satbayev University and is developed within the framework of the field "Manufacturing and Processing Industries." At the master's level, training in the specialty "Geology and Exploration of Solid Mineral Deposits" is carried out through trajectories aimed at implementing educational programs for training personnel in the geological sector, possessing advanced technical-analytical, scientific-pedagogical, and prognostic training.
6	Purpose of EP	Training, considering the country's development prospects, of competitive, highly qualified specialists with strong spiritual and moral qualities, ecological responsibility, and the ability for independent thinking. Graduates of the program should ensure the progressive scientific-technical, socio-economic, and cultural development of society by applying environmentally safe methods of geological exploration (SDG 15). Development of strategies for the effective use of mineral resources and the development of digital models of deposits and remote sensing technologies (SDG 9).
7	Type of EP	New EP
8	The level based on NQF	7
9	The level based on IQF	7
10	Distinctive features of EP	
11	List of competencies of educational program	Basic Competencies (BC) Professional Competencies (PC)
12	Learning outcomes of educational program	LO1 - To be able to identify the main idea and core message, as well as specific details, when listening to monologues, dialogues, and group discussions in the context of business and management; understand written and spoken English on topics related to management; write managerial texts (reports, letters, emails, meeting minutes) following a conventional structure with greater grammatical accuracy and using business vocabulary and expressions; speak about various business situations using appropriate business terminology and grammatical structures in pair and group discussions, meetings, and negotiations.

	LO2 - To know modern project management standards and their key characteristics, understand the PMI approach to project management, be able to plan investment activities, take project risks into account, apply methods for optimizing resource use, know ways to resolve conflict situations, and be able to analyze actual indicators for timely adjustment of the project's progress. LO3 - To know modern project management standards, including the initiation phase, development of a feasibility study, project charter, and other key documents. To be able to effectively apply the acquired knowledge in the development and analysis of documents related to project planning, use various decision-support methods, and conduct operational control over task execution and compliance with deadlines. To possess skills in personnel selection, effective team collaboration, conflict resolution, and project risk management. To be able to properly prepare managerial documentation, build professional communication, and use specialized software such as MS Project. The graduate should also be ready for independent learning of new tools and methods in the field of project management and for continuous professional development. LO4 - To know the laws of propagation, refraction, birefringence, and interference of light waves in crystalline media and the associated optical constants of minerals. To be able to use a polarizing microscope and a Fedorov stage. To have skills in studying and identifying rock-forming minerals using a polarizing microscope. LO5 - To know the principles of geological and computer modeling of mineral deposits. To be able to construct wireframe, block models and digital modeling processes (DMP), and to visualize geological and geochemical data. To have proficiency in GIS technologies and the "Micromine" software for resource estimation. To be familiar with the basics of open-pit mine design and industrial safety regulations. LO6 - To know the laws of formation and crystallization of magmatic melts, the modern classification and nomenclature of magmatic rocks, as well as their chemical and mineral composition, structure, and genesis of the main types and varieties of magmatites. To be able to analyze the chemical composition of rock-forming minerals, reconstruct the formation conditions of magmatic rocks, and make informed assumptions about the thermodynamic, chemical, and physical conditions of rock crystallization. To be able to study rock-forming minerals using a polarizing microscope.
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		LO7 - To know the principles of developing a comprehensive understanding of ecological and geological processes and their impact on the environment in order to ensure sustainable management of natural resources and the preservation of terrestrial ecosystems. To know the methods of assessing and forecasting the state of ecological and geological systems, techniques of ecological and geological monitoring and mapping, as well as the principles of environmental engineering surveys aimed at minimizing negative impacts on the lithosphere and preserving biodiversity. LO8 - To know the fundamentals of analyzing fold and fault structures, the metallogeny of Kazakhstan, and typical ore formations. To be able to interpret tectonic faults, analyze structural diagrams and metallogenic maps, and construct geological-genetic models. To apply telephoto-geological methods and develop structural research programs. To present geological data professionally and be prepared for further learning in the field of structural analysis and metallogeny. LO9 - To know the physical principles of well logging (geophysical well exploration, GIS) methods, as well as methodologies and approaches for interpreting GIS data. To be able to perform standard processing and interpretation of GIS data, evaluate reservoir filtration and storage properties based on integrated interpretation, use modern software tools for GIS data analysis, and present research results in the form of a scientific report. To have practical skills in working with Geooffice Solver and other software packages for processing and interpreting well log data.
13	Education form	Full-time
14	Period of training	2 years
15	Amount of credits	120
16	Languages of instruction	Russian
17	Academic degree awarded	Master of technical sciences
18	Developer(s) and authors	Baibatsha A., Arshamov Y., Assubayeva S., Baisalova A., Zhunusov A., Dauletuly A.

4.2. Relationship between the achievability of the formed learning outcomes based on educational program and academic disciplines

№	Discipline name	Short description of discipline	Кол-во кредито в		Формируемые результаты обучения (коды)								
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
Cycle of general education disciplines													
Required component													
1.	LNG213 Foreign Language (Professional)	Mastering professional English at an advanced level (for non-linguistic areas). The study of grammatical characteristics of scientific style in its oral and written forms. Professional oral communication in monological and dialogical form according to the educational program. Ability to demonstrate the results of research in the form of reports, abstracts, publications and public discussions; interpret and present the results of scientific research in a foreign language.	3	v									
2.	HUM214 Psychology management	The course is aimed at mastering the tools for effective employee management, based on knowledge of the psychological mechanisms of the manager's activity. Discipline will help you master the skills of making decisions, creating a favorable psychological climate, motivating employees, setting goals, building a team and communicating with employees. At the end of the course, undergraduates will learn how to resolve managerial conflicts, create their own image, analyze situations in the field of managerial activity, as well as negotiate, be stress-resistant and effective leaders.	3	v									
3.	HUM212 History	Purpose: to explore the history and philosophy	3	v									

	and Philosophy of Science	of science as a system of concepts of global and Kazakh science. Content: the subject of philosophy of science, dynamics of 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.										
4.	HUM213 Higher school pedagogy	The course is aimed at mastering the methodological and theoretical foundations of higher education pedagogy. The discipline will help to master the skills of modern pedagogical technologies, technologies of pedagogical design, organization and control in higher education, skills of communicative competence. At the end of the course, undergraduates learn how to organize and conduct various forms of organizing training, apply active teaching methods, and select the content of training sessions. Organize the educational process on the basis of credit technology of education.	3	v	v	v						
Cycle of general education disciplines Component of choice												
5.	GEO209 Geological Modeling of Mineral Deposits	Goal: Study of geological modeling of mineral deposits. Objectives: familiarization with the need for computer programs for visualization and interpretation of geological exploration data in a three-dimensional environment; practical development of three-dimensional modeling of mineral deposits;	5					v				v

		learning to work with graphical applications in the context of geological modeling; application of Micromine software for reservoir modeling and reserve assessment.											
6.	MNG781 Intellectual Property and Scientific Research	The purpose of this course is to provide undergraduates with the knowledge and skills necessary to understand, protect and manage intellectual property (IP) in the context of scientific research and innovation. 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		v								
7.	GEO218 - Mineral Deposits of Kazakhstan	Goal: Study of the state and prospects for the development of the mineral resource base of the Republic of Kazakhstan. Objectives: analysis of metallic minerals including iron, manganese, chromium, titanium, vanadium, copper, lead, zinc, aluminum, nickel, cobalt; study of deposits of tungsten, molybdenum, tin, tantalum, niobium, zirconium, rare earth elements; analysis of deposits of precious metals (gold, silver) and radioactive metals.	5									v	
8.	GEO760 Petrogenic Minerals	Purpose: Study of the optical properties of petrogenic minerals and their application for the classification of rocks. Objectives: mastering the refraction of light in minerals and optical effects under a microscope; study of birefringence and optical indicatrix of minerals of various systems; understanding the path of light in a polarizing microscope; mastery of the conoscopic method for determining the optical properties of minerals; practical use of the immersion method for	5					v					

		determining the refractive indices of minerals											
9.	MNG782 Sustainable development strategies	Purpose: To train graduate students in sustainable development strategies to achieve a balance between economic growth, social responsibility, and environmental protection. Content: 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						v	v			
10.	GEO202 Actual problems of geology	Purpose: study the formation, structure and composition of the Earth, as well as key geological processes. Objectives: study of the concept of “geological development of the Earth”; analysis of internal heat sources; study of leading geotectonic concepts, their advantages and disadvantages; identification of the nature and formation of structural elements of the earth's crust of oceans and continents; study of the mechanisms of deformation of rock layers.	5									v	
11.	GEO767 Genesis of the main industrial deposits	Purpose: Study of the genesis of the main industrial deposits. Objectives: Classification of pyrite deposits, provinces and ore regions; study of genetic types of deposits (Cypriot, Ural, Brazilian); analysis of the features of the formation of gold deposits in Kazakhstan; study of the spatiotemporal paragenetic connection of uranium and gold deposits and development of models for their formation; comparative analysis of uranium, iron ore and	5							v			

		copper deposits of Kazakhstan with world analogues and development of theories of their formation.											
12.	GEO224 Methods of stratigraphic studies	Purpose: To study stratigraphic research methods to understand geological history. Objectives: Analysis of the international geological time scale; study of biostratigraphic division and correlation of geological sections; development of seismostratigraphic division and correlation of sections; understanding of the main common stratigraphic units; study of local stratigraphic units of Kazakhstan; analysis of stratigraphic units of a private fund and their support.	5							v		v	
Cycle of profile disciplines Component of choice													
13.	GEO220 Metallogeny and Ore Formations of Kazakhstan	Goal: Study of metallogeny and ore formations of Kazakhstan in order to understand the processes of ore formation and consider various metallogenic situations. Objectives: familiarization with the concepts of metallogeny and minerageny; study of the general principles of ore-forming processes and systems; understanding of ore formation analysis and formations of various types; consideration of metallogenic studies and their general principles; analysis of metallogeny in various geological settings and modern seas and oceans	5							v		v	
14.	GEO208 The geological structure of ore fields and deposits	Goal: Study the geological structures of ore fields and deposits in order to understand their formation and role in the process of ore formation. Objectives: analysis of the theoretical foundations of structural analysis	5							v		v	

		and study of the tectonic properties of rocks; analysis of the main stages of development of the structures of ore fields and deposits; identifying the role of plicative and disjunctive dislocations in the process of ore formation; study of patterns of localization of mineralization in geological structures of various genetic types										
15.	GEO285 Data Mining	Goal: Study of Datamine software and its application in the mining industry to solve various problems. Objectives: familiarization with the functionality of the program and its leading position in the industry; understanding the processes of constructing geological models and designing mines and quarries; studying production process management methods using the Datamine program; analysis of standard data from geology, geochemistry and surveying to optimize processes in the mining industry.	5			v	v					
16.	GEO211 Geology of the ore-bearing regions of Kazakhstan	Goal: Study of the geological features of ore-bearing areas of Kazakhstan using modern analysis methods. Objectives: to generalize geological-geophysical, ore-metallogenic, lithochemical and petrological data on ore-bearing areas; analyze the geodynamic and structural-tectonic characteristics of these areas; identify the connection between the geological structure and the presence of ore deposits in Kazakhstan; assess the prospects of ore-bearing areas for further study and development.	5						v		v	
17.	GEO214 Advanced well	The course contains an information and educational lecture module and practical	5					v				

	logging	diagrams of various geophysical methods, both in the form of hard copies for visual analysis, and in digital form to get acquainted with interpretation techniques using examples of demonstration programs. The course focuses on the practical application of borehole modifications of geophysical methods, on the analysis of the conditions for their applicability and natural limitations. A number of typical problems, both purely geophysical and geological, solved by borehole geophysics are considered.										
18.	GPH211 GIS of Uranium Deposits	Goal: Study the use of geographic information systems (GIS) in the analysis of uranium deposits. Objectives: to study the relationship between the geological characteristics of the section and their physical properties obtained from geophysical studies of ore wells; master methods for complex interpretation of well section diagrams to identify ore intervals and assess the quality of uranium minerals; use data from laboratory core studies to analyze the physical properties, composition of the section and parameters of ore bodies	5					v				
19.	GEO231 Basics of petrology	Goal: Study the basics of petrology with an emphasis on modern data on magmas and their origin. Objectives: understand the physicochemical basis of crystallization of magmatic melts; study the main reasons for the diversity of magmatites; determine the chemical and mineral composition, structure of magmatites and their genetic significance; consider rocks of various compositions and their relationship with mineral deposits;	5				v		v			

		master methods of studying rocks using a polarizing microscope; study igneous associations											
20.	GEO758 Petrochemistry	Goal: Mastering the methods of petrochemical analysis to study the chemical composition of rocks. Objectives: study of the petrochemical method of recalculation according to A.N. Zavaritsky for magmatites and analysis of research results; mastering methods for studying the chemical composition of metamorphites according to various authors and identifying protoliths; study of the chemical composition of metasomatic rocks using various methods and construction of diagrams to analyze the research results.	5					v					
21.	GEO240 Regional geology of the UIC	Goal: Study of the regional geology of the CIS and Baltic countries with an emphasis on the basics of tectonic zoning. Objectives: analysis of ancient platforms, including the East European and Siberian platforms; study of folded regions of the Ural-Mongolian belt, such as the Ural-Novozemelskaya, Southern Tien Shan, Kazakh-Kyrgyz, Zaisan, Altai-Sayan, and Sayan-Yenisei folded regions; consideration of the geological features of the Baikal and Transbaikal regions, as well as the Taimyr-Severozemelskaya region; study of young EpiPaleozoic plates of Eurasia.	5							v			
22.	GEO709 Geotectonics with geodynamics basics	Goal: Study of geotectonics and the fundamentals of geodynamics with an emphasis on the practical application of geophysical methods in the study of the earth's crust. Objectives: familiarization with the informational and educational lecture module;	5							v			

		study of practical diagrams of various geophysical methods for visual analysis; familiarization with methods for interpreting geophysical data using examples of demonstration programs; analysis of the use of well modifications of geophysical methods and their limitations; solving typical geophysical and geological problems using borehole geophysics.										
23.	GEO768 Actual problems of modern subsurface	Goal: Study of current problems and features of subsoil use in Kazakhstan, taking into account its transition to international standards. Objectives: analyze the features of subsoil use in Kazakhstan; assess the current state of subsoil use, taking into account the nation's execution plan (steps 74 and 75); study the process of Kazakhstan's transition to international standards and rules in the field of exploration and use of subsoil.	5			v						
24.	GEO210 Geological Support of Subsoil Use	Goal: Study of geological support for subsoil use in order to increase the efficiency of use of subsoil resources. Objectives: study the features of modern subsoil use and identify objects and subjects of this process; analysis of legal regulation of subsoil ownership and geological information; assessing the reliability of geological data and developing ways and means to increase this reliability; study of modern methods of collecting, processing and analyzing information about the subsoil, including geoinformation technologies.	5			v						
25.	GEO233 Basics of ecological	Goal: Mastering the theoretical foundations of environmental geology to understand and	5							v		

	geology	assess the state of ecological and geological conditions. Objectives: to study the structure of the composition and methods for assessing ecological and geological conditions; understand the ecological functions of the lithosphere and the features of their formation under the influence of various reasons; consider the resource, geodynamic, geochemical and geophysical environmental functions of the lithosphere; understand the spatiotemporal changes in the ecological function of the lithosphere under the influence of natural and man-made factors.										
26.	GEO227 Mineralogy of Radioactive and Rare Earth Elements	Goal: To prepare specialists in the field of uranium geology, equipped with in-depth knowledge of the mineralogy of radioactive and rare earth elements and methods of their diagnosis. Objectives: to study the mineral forms of radioactive and rare earth elements; master methods for diagnosing radioactive minerals; learn to identify paragenetic mineral associations and assess their significance for the search and development of deposits; analyze the types of ores and their genetic classification.	5						v	v		
27.	GEO283 Actual problems of stratigraphy	Goal: Study of current problems in stratigraphy in order to understand geochronological aspects. Objectives: study the international geochronological scale; carry out biostratigraphic division and correlation of geological sections; master seismostratigraphic methods of section subdivision and correlation; study the main common stratigraphic units; analyze local	5			v						

		stratigraphic units of Kazakhstan; determine the types of stratigraphic units and criteria for their identification; study relative geochronology and its applications.											
28.	GEO769 Volumetric modeling and predictive evaluation of mineral deposits	Goal: Training in methods of three-dimensional modeling of mineral deposits for carrying out forecasting and prospecting, metallogenic and exploration work. Objectives: to study methods of three-dimensional wireframe and block modeling of ore bodies based on actual data; master methods of interpretation, interpolation and visualization of geological and geochemical data; prepare and import geological exploration data into the Micromine GIS; conduct geostatistical data analysis and build digital models of the surface and quarry of deposits.	5						v				
29.	MNG705 Project Management	Goal: Gaining knowledge about the components and methods of project management based on modern models and standards. Objectives: study of behavioral models of project-oriented management of business development; mastering international standards PMI PMBOK, IPMA ICB and national standards of the Republic of Kazakhstan in the field of project management; analysis of the features of organizational management of business development through the integration of strategic, project and operational management.	5							v	v		
30.	GEO223 Methods of Lithological	Purpose: To introduce students to lithological research methods to understand the structure,	5							v			

	Research	composition and origin of sedimentary rocks. Objectives: to study the mineral and chemical composition of sedimentary rocks; understand the occurrence patterns and origin of these rocks; consider methods for studying the composition and origin of minerals of sedimentary origin; study methods for determining the age and history of formation of sedimentary rocks; master techniques for interpreting lithological data to solve geological problems										
31.	GEO212 Geochemistry of Radioactive Elements	Goal: Study the basics of geochemistry of radioactive elements in order to understand their distribution, forms of migration and concentration. Objectives: analyze the content of uranium and thorium in minerals, rocks, rock formations and complexes, lithosphere and space; identify patterns of distribution and forms of occurrence of radioactive elements; study the conditions of the form of migration; historically characterize the development of radiogeochemistry; describe the general features of the geochemistry of radioactive elements and their basic properties.	5								v	

WORKING CURRICULUM

Academic year	2025-2026 (Autumn, Spring)
Group of educational programs	M121 - "Geology"
Educational program	7M07206 - "Geology and exploration of solid mineral deposits"
The awarded academic degree	Master of Technical Sciences
Form and duration of study	full time (scientific and pedagogical track) - 2 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	lek/lab/pr Contact hours	in hours SIS (including TSIS)	Form of control	Allocation of face-to-face training based on courses and semesters				Prerequisites
									1 course		2 course		
									1 sem	2 sem	3 sem	4 sem	
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)													
CYCLE OF BASIC DISCIPLINES (BD)													
M-1. Module of basic training (university component)													
LNG213	Foreign language (professional)		BD, UC	3	90	0/0/30	60	E	3				
HUM214	Psychology of management		BD, UC	3	90	15/0/15	60	E	3				
HUM212	History and philosophy of science		BD, UC	3	90	15/0/15	60	E		3			
HUM213	Higher school pedagogy		BD, UC	3	90	15/0/15	60	E		3			
M-2. Basic geological training module (component of choice)													
GEO209	Geological modeling of mineral deposits	1	BD, CCH	5	150	30/0/15	105	E	5				
MNG781	Intellectual property and research	1	BD, CCH	5	150	30/0/15	105	E	5				
GEO218	Mineral deposits of Kazakhstan	1	BD, CCH	5	150	30/0/15	105	E	5				
GEO760	Petrogenetic minerals	2	BD, CCH	5	150	30/0/15	105	E	5				
MNG782	Sustainable development strategies	2	BD, CCH	5	150	30/0/15	105	E	5				
GEO202	Actual problems of geology	2	BD, CCH	5	150	30/0/15	105	E	5				
GEO767	Genesis of the main industrial deposits	1	BD, CCH	5	150	30/0/15	105	E		5			
GEO224	Methods of stratigraphic studies	1	BD, CCH	5	150	30/0/15	105	E		5			
M-4. Practice-oriented module													
AAP273	Pedagogical practice		BD, UC	8				R			8		
CYCLE OF PROFILE DISCIPLINES (PD)													
M-3. Module of professional geological training (component of choice)													
GEO208	The geological structure of ore fields and deposits	1	PD, CCH	5	150	30/0/15	105	E	5				
GEO211	Geology of the ore-bearing regions of Kazakhstan	1	PD, CCH	5	150	30/0/15	105	E	5				
GEO220	Metallogeny and ore formations of Kazakhstan	2	PD, CCH	5	150	30/0/15	105	E	5				
GEO285	Data Mining	2	PD, CCH	5	150	30/0/15	105	E	5				
GEO240	Regional geology of the UIC	2	PD, CCH	5	150	30/0/15	105	E		5			
GEO709	Geotectonics with geodynamics basics	2	PD, CCH	5	150	30/0/15	105	E		5			
GEO768	Actual problems of modern subsurface	3	PD, CCH	5	150	30/0/15	105	E		5			

GEO210	Geological support of subsoil use	3	PD, CCH	5	150	30/0/15	105	E		5			
GEO233	Basics of ecological geology	4	PD, CCH	5	150	30/0/15	105	E		5			
GEO227	Mineralogy of radioactive and rare earth elements	4	PD, CCH	5	150	30/0/15	105	E		5			
GEO231	Basics of petrology	1	PD, CCH	5	150	30/0/15	105	E			5		
GEO758	Petrochemistry	1	PD, CCH	5	150	30/0/15	105	E			5		
GEO283	Actual problems of stratigraphy	2	PD, CCH	5	150	30/0/15	105	E			5		
GEO769	Volumetric modeling and predictive evaluation of mineral deposits	2	PD, CCH	5	150	30/0/15	105	E			5		
MNG705	Project Management	2	PD, CCH	5	150	30/0/15	105	E			5		
GEO223	Methods of lithological research	3	PD, CCH	5	150	30/0/15	105	E			5		
GEO212	Geochemistry of radioactive elements	3	PD, CCH	5	150	30/0/15	105	E			5		
GEO214	Advanced well logging	4	PD, CCH	5	150	15/0/30	105	E			5		
GPH211	GIS uranium deposits	4	PD, CCH	5	150	30/15/0	105	E			5		
M-4. Practice-oriented module													
AAP269	Research practice		PD, UC	8				R				8	
M-5. Experimental research module													
AAP268	Research work of a master's student, including internship and completion of a master's thesis		RWMS	4				R	4				
AAP268	Research work of a master's student, including internship and completion of a master's thesis		RWMS	4				R		4			
AAP251	Research work of a master's student, including internship and completion of a master's thesis		RWMS	2				R			2		
AAP255	Research work of a master's student, including internship and completion of a master's thesis		RWMS	14				R				14	
M-6. 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			
		Required component (RC)	University component (UC)	Component of choice (CCH)	Total
GED	Cycle of general education disciplines	0	0	0	0
BD	Cycle of basic disciplines	0	20	15	35
PD	Cycle of profile disciplines	0	8	45	53
Total for theoretical training:		0	28	60	88
RWMS	Research Work of Master's Student				24
ERWMS	Experimental Research Work of Master's Student				0
FA	Final attestation				8
TOTAL:					120

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

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

Signed:

Governing Board member - Vice-Rector for Academic Affairs

Approved:

Vice Provost on academic development

Head of Department - Department of Educational Program
Management and Academic-Methodological Work

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

Department Chair - Geological survey, search and exploration
of mineral deposits

Representative of the Academic Committee from Employers
____Acknowledged____

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Baisalova A. .

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