Mining and metallurgy Institute named after O.A.Baikonurov

Mining Department

EDUCATIONAL PROGRAM

6B07205 - Mining Engineering

Code and classification of the field of education:	6B07 – Engineering, manufacturing and construction industries
Code and classification of training directions:	6B072 – Manufacturing and processing industries
Group of educational programs:	B071 – Mining and mineral extraction
Level based on NQF:	Level 6 - higher education and practical experience
Level based on IQF:	Level 6 - A wide range of specialized (theoretical and practical) knowledge (including innovative knowledge). Independent search, analysis and evaluation of professional information
Study period:	4 years
Amount of credits:	240

Almaty 2024

Educational program 6B07205 - Mining Engineering was approved at the meeting of K.I. Satbayev KazNRTU Academic Council
Minutes № 12 dated 22 April 2024.

Was reviewed and recommended for approval at the meeting of K.I. Satbayev KazNRTU Educational and Methodological Council
Minutes № 6 dated 19 April 2024.

Educational program 6B07205 - Mining Engineering was developed by Academic committee based on direction «Manufacturing and processing industries »

Full name	Academic degree/ academic title	Position	Workplace	Signature
Chairperson of Academic Committee:				
Moldabayev Serik	Doctor of Technical Sciences	Head of the Department	KazNRTU named after K.I.Satpayev	
Teaching staff:				
Yusupov Kh.	Doctor of Technical Sciences	professor	KazNRTU named after K.I.Satpayev	
Sandbekov Manarbek	Candidate of Technical Sciences	professor	KazNRTU named after K.I.Satpayev	
Employers:				
Buktukov Nikolay	Doctor of Technical Sciences	professor	Institute of Mining named after. D. Kunaeva	
Amankulov Maksat	Master of Engineering sciences	Executive Director	Antai LLP	
Orynbayev Baurzhan	Master of Engineering sciences	Head of the BVR parameters department	NPP Interrin LLP	
Gryaznov Vyacheslav	Master of Engineering sciences	Head of the mining Department	Antai LLP	
Students				
Slyambekov Elnar		4th year student OP 6B07205 - Mining engineering	KazNRTU named after K.I.Satpayev	
Shabazz Din-Muhammad		master's student 2 courses	KazNRTU named after K.I.Satpayev	
Asylkhanova Gulnur	Master of Engineering sciences	2nd year doctoral student	KazNRTU named after K.I.Satpayev	

Table of contents

List of abbreviations and designations

NJSC 'Kazakh National Research Technical University named after K.I. Satpayev' - NJSC (non-profit joint stock company) KazNITU named after K.I. Satpayev;
SOSE - State obligatory standard of education of the Republic of Kazakhstan;
MES RK - Ministry of Education and Science of the Republic of Kazakhstan;
EP - educational programme;
IWS - independent work of a student (student, master's student, doctoral student);
IWST - independent work of a student with a teacher (independent work of a student (master's student, doctoral student) with a teacher);
WSP - work study plan;
CED - catalogue of elective disciplines;
UC - university component;
EC - elective component;
NQF - national qualifications framework;
NQF - national qualifications framework; SQF - sectoral qualifications framework;
LO - learning outcomes;
KC - key competences.

1 Description of educational program

It is intended for the implementation of profile training of bachelors in the educational program 6B07205 - “Mining Engineering” at Satbayev University and is developed within the framework of the direction “Production and processing industries”.

The purpose of educational programs (EP) in the specialty “Mining Engineering” is to provide training for mining enterprises professionally educated and competent specialists who are able to work in primary engineering and technical positions and effectively conduct the extraction of natural resources in various mining and geological and mining conditions on the basis of advanced technologies and modern mining transport equipment.

The content of the educational program EP “Mining Engineering” based on the development of multilevel system of training, fundamental and quality of education, continuity and continuity of education and science, the unity of education, training, research and innovation activities, aimed at maximum satisfaction of customer needs should provide:

- obtaining a full-fledged and high-quality professional education in the field of MD development, confirmed by the level of knowledge and skills, skills and competencies, based on the criteria established by the State General Education Standard, their assessment, both in terms of content and volume
- ensuring the training of bachelors

for the mining industry, knowing the technology, complex mechanization, organization and economics of mining production, methods and principles of its improvement and design. For example, highly mechanized coal mines of Ekibastuz (Bogatyr Komir LLP, Vostochny cut of Euro-Asian Energy Corporation JSC), enterprises of high production culture on the basis of iron ore deposits (Sokolovsko-Sarbai Mining and Processing Production Association JSC).

- training of professional and competitive specialists in the field of MD development and creation of new technologies of mining production and production management;
- ability to apply knowledge of mathematics, fundamental and technical sciences;
- use of methods of analyzing and evaluating the results of experiments;

Knowledge of modern problems of mining production;

Contribute to the acquisition of practical skills in the development of minerals, mathematical processing of scientific research results, compilation of technological passports of technological processes with the use of modern information technologies;

Ability to use methods, skills and modern technical means necessary in engineering practical activity;

Ability to find and work with the necessary literature, computer information, databases and other sources of information to solve the tasks;

To form students' teamwork skills, industrial and ethical responsibility, ability to understand the problem and from joint work with different specialists to

find solution options, the need to improve their knowledge and skills;

The objects of professional activity of the student are mining enterprises of ferrous and non-ferrous metallurgy, fuel and energy complex, production of non-metallic mining raw materials, sectoral research and design institutes, laboratories of higher and secondary technical, primary vocational educational institutions.

The subject of professional activity of students in the specialty “Mining Engineering” is the improvement of mining technology, development and creation of new equipment and mining technology, taking into account the needs of the mining industry of the Republic of Kazakhstan.

Types of professional activities of students in the specialty “Mining Engineering” are:

- organizational and managerial;
- production-technological;
- experimental-research;
- calculation-design and analytical;
- program-management;
- educational and pedagogical.

The functions of professional activity include:

- control over the implementation of technological processes of mineral extraction;
- quality control of minerals;
- analyzing the environmental and economic performance of mining operations;
- improvement of technological processes of ore mining;
- organization and management of production;
- technical and economic analysis of technological processes and production activities;
- training and professional development of personnel.

Requirements for professional competencies:

Bachelor's degree in specialty 6B07205 “Mining Engineering” should solve the following tasks in accordance with the types of professional activities:

- in the field of organizational and managerial activity:
- participation in the organization of work aimed at forming the creative character of the activity of production teams;
- development of plans for various types of work and control of their implementation, including the provision of relevant services with the necessary technical documentation, materials, equipment;
- finding optimal solutions when performing works taking into account the requirements of quality, cost, execution time, competitiveness and life safety and reliability;
- technical equipment and organization of workplaces;
- implementation of technical control of work performance;
- in the field of production and technological activities:
- conducting physical and experimental research using modern methods and techniques of measurement and processing of obtained results;

- implementation of technological processes of production, quality control of elements and units of various purposes;

- calculation of production rates, technological standards of production, selection of standard equipment, preliminary assessment of economic efficiency of field development and mining operations;

- efficient use of mining machinery and equipment, selection and calculation of technological process parameters for ore excavation;

- standardization and certification of mining products;

- environmental control of production;

- participation in the development and exploitation of mineral deposits;

- in the field of experimental and research activities:

- carrying out measurements and research in MD mining with the choice of modern technical means and computerized processing of results;

- in the field of calculation-design and analytical activity:

- development of generalized options for solving problems, analysis of these options, prediction of consequences, finding compromise solutions in conditions of multi-criteria, uncertainty, planning and implementation of projects in MD extraction;

- use of information technologies to select the necessary equipment and technology in the development of MD and construction of mining enterprises;

in the field of program and management activities:

- computerized selection of technology and equipment for mineral development;

- application of computer technologies for geoinformation systems;

- information support of devices and systems.

in the field of educational and pedagogical activity:

- ensuring quality transfer of skills and knowledge and ability to work with staff in their training.

The main requirements for socio-ethical competencies of the graduate are:

- to know socio-ethical values based on public opinion, traditions, customs, social norms and be able to navigate in them in their professional activities;

- know the traditions and culture of the peoples of Kazakhstan;

- to know the basics of the legal system and legislation of Kazakhstan;

- to know tendencies of social development of society.

Requirements for economic and organizational and managerial competencies.

A graduate should:

- Possess the basics of technical and economic knowledge, have scientific ideas about management, marketing, finance, etc.;

- be able to express and justify his/her position on the choice of methods for solving the set tasks;

- possess organizational skills, be able to create mobile working groups to achieve the set goals and be able to manage such a group, be able to protect their rights and demand from them the fulfillment of their duties;

- be able to take responsibility for decision-making and defend their position on organizational and managerial activities.

- To know and understand the goals and methods of state regulation of the economy.

The subjects of professional activity of a bachelor are improvement of technology of mining of minerals, development and creation of new technique and technology of mining taking into account the needs of mining and nuclear industry of the Republic of Kazakhstan.

Specific types of professional activities, for which the Bachelor is mainly prepared, are determined by the higher education institution together with students, scientific and pedagogical staff of the higher education institution and associations of employers.

2 Purpose and objectives of educational program

Sustainable Development goal:

Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Education lays the foundation for improving the socio-economic living conditions of people and plays a key role in ensuring a way out of poverty. To protect the well-being of children and ensure their access to lifelong learning, in March 2020 UNESCO launched the Global Coalition on COVID-19 Education, a multisectoral partnership between UN agencies, civil society organizations, the media, and IT partners to develop and implement innovative solutions. In particular, the Global Coalition on Education aims to: • Assisting countries in mobilizing and implementing innovative and situation-specific distance learning solutions using high-tech, low-tech and non-technological approaches. One of the stages of this program is:

4.a Create and improve accessible and safe educational institutions. Create and improve educational institutions that take into account the interests of children, the special needs of persons with disabilities and gender aspects, and ensure a safe, violence-free and social barrier-free and effective learning environment for all. Shortcomings in education lead to limited opportunities for young people in the labor market and, as a result, slow economic growth. The economy of Kazakhstan is directly dependent on the mining and metallurgical complex. The technical and technological development of the industry is impossible without qualified personnel. This educational program is aimed at training engineering and technical specialists in the mining industry.

Purposes of EP 6B07205 – Mining engineering:

- providing training of professionally educated and competent specialists capable of working in primary engineering and technical positions for mining enterprises;

- effectively extract natural resources in various mining and geological and mining-technical conditions on the basis of studying general education, basic and specialized disciplines

- providing in-depth knowledge of natural-scientific, general technical and economic character as a foundation of professional education.

- Formation of theoretical knowledge and practical skills in the field of

- formation of the graduate's ability to apply the acquired knowledge in his/her professional activity.

Tasks of EP 6B07205 – Mining engineering:

- study of the cycle of general disciplines to provide socio-humanitarian education based on the laws of socio-economic development of society, history, modern information technologies, state language, foreign and Russian languages;
- the cycle of profiling disciplines is oriented to the study of key theoretical aspects of engineering and technology to ensure safe and effective implementation of various technologies of mining, processing of solid minerals and rational use of natural resources;
- study of disciplines on the development of uranium deposits, extraction of natural resources by open and underground methods on the basis of advanced technologies, planning the construction of industrial facilities at mining enterprises and urban underground facilities for various purposes;
- study of disciplines forming knowledge skills and abilities of planning and organization of research, design of mining works;
- familiarization with the technologies and equipment of enterprises during the period of various types of practices;
- acquisition of skills and abilities of laboratory research, technological calculations, equipment selection and design with the use of modern computer technologies and programs.
- combining the efforts of the university and production enterprises to conduct research, training and retraining in the study of principles and regularities of functioning and development of cities and megacities, features of anthropogenic impacts on urban environment, principles of sustainable development of urbanized areas and measures of their organizational and legal support with the provision of true interdisciplinarity of education in these areas;
- formation of skills and abilities to choose and evaluate methods of environmental protection from anthropogenic impact in urbanized areas;
- strengthening of the technological component of classical natural science education, to provide knowledge of modern technologies without lowering the bar of fundamental education;
- the basis for the development and conduct of fundamental and applied research and development in the field of geological exploration and mineral processing, mining and metallurgy using new achievements of technologies, new generation techniques and ecomonitoring of enterprises;
- ensuring interaction of fundamental and applied science with the educational process at all its stages, including the use of the results of joint research work in lecture courses, experimental base for the performance of educational and research, laboratory and course work, industrial and pre-graduation practice;
- improving the level of educational and methodical work by creating new curricula, textbooks, teaching and methodical manuals, including on electronic media;
- ensuring training and retraining of personnel for the domestic mining and

metallurgical sector in close cooperation with state corporations and the real sector of the economy, employment of graduates in knowledge-intensive innovative companies and other research centers;

- organization of effective cooperation with foreign universities for the development of new generation educational standards, implementation of student exchange, training and retraining of specialists of the mining and metallurgical sector under specialized bachelor's degree programs;

- implementation of international cooperation in the field of development of new technologies in the mining and metallurgical industry through the implementation of joint contracts, participation in international conferences, organization of international exchange of employees, students and young scientists with specialized universities and laboratories of the world, international scientific and educational organizations.

3 Requirements for evaluating the educational program learning outcomes

As a result of mastering the Bachelor's degree program 6B07205 - “Mining Engineering” the graduate shall have general cultural, general professional and professional competencies.

The graduate who has mastered the Bachelor's degree program shall possess the following competencies:

general cultural competences:

- ability to use the basics of philosophical knowledge, analyze the main stages and regularities of historical development to realize the social significance of his/her activity;
- the ability to use the basics of economic knowledge in assessing the effectiveness of the results of activities in various spheres;
- ability to communicate orally and in writing in Russian and foreign languages to solve problems of interpersonal and intercultural interaction;
- ability to work in a team, tolerantly accepting social, ethnic, confessional and cultural differences;
- ability to self-organization and self-education;
- ability to use general legal knowledge in various spheres of activity;
- ability to maintain a proper level of physical fitness to ensure full-fledged social and professional activity;
- readiness to use basic methods of protection of production personnel and population from possible consequences of accidents, catastrophes, natural disasters.

general professional competencies:

- readiness to use fundamental general engineering knowledge;
- readiness to critically analyze the accumulated experience, to change the profile of one's professional activity if necessary;
- ability to realize the social significance of his/her future profession;
- readiness to combine theory and practice to solve engineering problems;

- ability to apply in practice the principles of rational use of natural resources and environmental protection;
- ability to use normative legal documents in his/her professional activity;
- readiness to choose measuring instruments in accordance with the required accuracy and operating conditions;
- ability to follow metrological norms and rules, fulfill the requirements of national and international standards in the field of professional activity;
- ability to use the principles of quality management system.

professional competencies corresponding to the type(s) of professional activity, which the Bachelor's program is focused on:

research activity:

- ability to analyze and synthesize;
- ability to choose research methods, plan and conduct necessary experiments, interpret results and draw conclusions;
- readiness to use physical and mathematical apparatus to solve problems arising in the course of professional activity;
- readiness to use basic concepts, laws and models of mining development, rock mass behavior, rock destruction by explosion;
- ability to choose and apply appropriate methods of modeling of physical, chemical and technological processes.

project-analytical activity:

- Ability to perform technical and economic analysis of projects;
- ability to use the process approach;
- ability to use information tools and technologies in solving problems arising in the course of professional activity;
- readiness to make calculations and draw conclusions when solving engineering problems.

production and technological activity:

- ability to carry out and adjust technological processes in mining;
- readiness to identify objects for improvement in engineering and technology;
- ability to choose materials for products of various purposes, taking into account operational requirements and environmental protection;
- readiness to assess risks and determine measures to ensure safety of technological processes.

design and technological activity:

- ability to fulfill elements of projects;
- readiness to use standard software tools in designing;
- ability to justify the choice of equipment for the implementation of technological processes.

additional competencies in the field of organizational and management activities agreed with employers:

- ability to apply methods of technical and economic analysis;
- readiness to use the principles of production management and personnel management;

- readiness to use organizational and legal bases of managerial and entrepreneurial activity;

- ability to organize the work of the team to achieve the set goal.

additional general professional competencies (AGPCs) focused on knowledge areas: communication, individual and teamwork, lifelong learning, additional engineering skills:

- ability to acquire new, expand and deepen previously acquired knowledge, skills and competencies in various areas of life necessary for successful realization in the field of professional activity, including at the intersection of different areas of activity and fields of sciences.

Special requirements for graduation under this OP:

- the student must have a general idea of the thesis topic/research plans, and contact potential supervisors one year prior to expected graduation;

- to get acquainted with potential supervisors and accelerate the student's choice of thesis (project) topics, a review meeting is held one year prior to the expected completion of studies;

- in order to collect the necessary data and study the actual tasks, methods and procedures on the topic of the thesis, the student undergoes an industrial practice;

- upon completion of the internship, the student contacts the supervisor in writing or verbally and reports on the results of the work, but no more than one week after the beginning of the 4th year of study.;

- within 4 weeks after the start of studies, the student and the supervisor must discuss and decide on the type (research, project or independent study) and topic of the thesis. This is an extremely important discussion and decision, as it is impossible to change the topic and type of work further;

- the topic of the thesis (project) and supervisor are assigned to a student or a group of students no more than six weeks after the beginning of the final year of study and is approved by the order of the rector of the higher education institution.

4 Passport of educational program

4.1 General information

№	Field name	Comments
1	Code and classification of the field of education	6B07 – Engineering, manufacturing and construction industries
2	Code and classification of training directions	6B072 – Manufacturing and processing industries
3	Educational program group	B071 – Mining and mineral extraction
4	Educational program name	Mining engineering
5	Short description of educational program	Mining operations in open pit, underground and geotechnological mining, construction of mines and underground facilities. Main technological processes: preparation of rocks for excavation, excavation and loading operations, transportation, unloading and dumping operations, primary processing of mined minerals.
6	Purpose of EP	The purpose of the educational program (EP) is to provide training of professionally educated and competent specialists for mining enterprises, capable of working in primary engineering and technical positions and efficient mining of natural resources in various mining and geological and mining conditions on the basis of studying general education, basic and profile disciplines.
7	Type of EP	Innovative EP
8	The level based on NQF	Level 6 - higher education and practical experience
9	The level based on IQF	Level 6 - a wide range of specialized (theoretical and practical) knowledge (including innovative knowledge). Independent search, analysis and evaluation of professional information
10	Distinctive features of EP	Geotechnology training is conducted at the junction of related sciences in geomechanics and information technology on the basis of the Geomechanics and Geotechnology Research Laboratory, equipped with unique servo-hydraulic systems manufactured in the USA and licenses for 5 software products such as Micromine, Deswik, Netrpomine, Ventsim and Rocscience for the design of mining enterprises and numerical modeling of geomechanical processes.
11	List of competencies of educational program	Matrix of correlation of the learning outcomes of the educational program as a whole with the competences formed
12	Learning outcomes of educational program	1) Describe, in accordance with terminology, the technology of development of solid mineral deposits and select the most optimal technological complexes of equipment in specific mining and geological and mining engineering conditions 2) Solve the problem of achieving digital literacy based on the study of geoinformation systems on geotechnology and geomechanics 3) Select and apply software products for work with digital models of deposits, preparation of working drawings and calculation of volumes in planning and design of mining works, operation of mining enterprises 4) Identify the relationship between related technological processes of mining production to find reserves to increase the volume of mineral production 5) To establish a careful attitude to the Earth's subsoil through a wide range of theoretical and practical training on the completeness of the

		extraction of all reserves and their comprehensive development in compliance with the rules of industrial and environmental safety. 6) Select effective solutions for the implementation of technological processes at mining enterprises of ferrous and non-ferrous metallurgy, heat and power complex, non-metallic building materials, nuclear industry, construction of subways 7) Determine methods of establishing spatial and temporal characteristics of the state of the earth's surface and subsoil, mining systems, underground and surface structures and displaying information in accordance with modern regulatory requirements 8) Plan monitoring of the condition of mine workings, buildings, structures and earth surface at all stages of development and protection of subsoil with the use of digital technologies 9) Apply modern information technologies and automated production management systems to create SMART mines and programs to assess the stability of mine workings 10) Develop independently mining passports and technological maps, technological regulations, mining development plan and propose options for implementation of mining technological processes, organize their implementation at primary engineering positions 11) Show the required knowledge and primary skills on the ability and readiness to operate electrical systems of mining enterprises, including complex electrical equipment of closed and mine design, electrical networks of open and underground mining and mining-construction works, including under emergency conditions 12) Discover and confirm the ability to select the most expedient technology for mining, processing and mineral processing, to draw up the necessary documentation in accordance with applicable regulations
13	Education form	Full-time
14	Period of training	4 years
15	Amount of credits	240
16	Languages of instruction	Kazakh/Russian
17	Academic degree awarded	Bachelor of Engineering and Technology
18	Developer(s) and authors	Academic committ

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

№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)											
				LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12
Cycle of general education disciplines Compulsory component															
1	Foreign language	After determining the level (according to the results of diagnostic testing or IELTS results), students are assigned to groups and disciplines. The name of the discipline corresponds to the level of English language proficiency. When moving from level to level, the prerequisites and post-requisites of the disciplines are observed	10	X											
2	Kazakh (Russian) language	The course covers socio-political, socio-cultural spheres of communication and functional styles of the modern Kazakh (Russian) language. The course highlights the specifics of scientific style in order to develop and activate students' professional-communicative skills and abilities. The course allows students to practically master the basics of scientific style and develops the ability to make structural and semantic analysis of the text	10	X											
3	Physical Education	The aim of the discipline is to master the forms and methods of forming a healthy lifestyle within the system of professional education. Familiarisation with the natural-scientific bases of physical education, mastery of modern health-improving technologies, basic methods of independent physical training and sports. Also within the framework of the course the student will master the rules of refereeing in all kinds of sports	8	X											
4	Information and communications technology (English)	The aim of the discipline is to acquire theoretical knowledge about information processes, new information technologies, local and global networks of computers, methods of information protection; to acquire skills in using text editors and table processors; to create databases and various categories of applied programmes.	5				X								
5	History of Kazakhstan	The purpose of the discipline is to give objective historical knowledge about the main stages of the history of Kazakhstan from ancient times to the present day; to acquaint students with the problems of formation and development of statehood and historical and cultural processes; to promote the formation of humanistic values and patriotic feelings in the student; to teach the student to use the obtained historical knowledge in educational, professional and everyday life; to assess the role of Kazakhstan in world history.	5		X										

6	Philosophy	The aim of the discipline is to teach students the theoretical foundations of philosophy as a way of cognition and spiritual development of the world; to develop their interest in fundamental knowledge, to stimulate the need for philosophical assessments of historical events and facts of reality, to assimilate the idea of the unity of the world historical and cultural process while recognising the diversity of its skills in the application of philosophical and general scientific methods in professional activities.	5				X									
7	Socio-political knowledge module (sociology, political science)	The objectives of the disciplines are to provide students with explanations on the sociological analysis of society, social communities and personality, factors and regularities of social development, forms of interaction, types and directions of social processes, forms of regulation of social behaviour, as well as primary political knowledge, which will serve as a theoretical basis for comprehension of socio-political processes, for formation of political culture, development of personal position and clearer understanding of the measure of one's responsibility;; help to master the political-legal, moral-ethical and socio-cultural norms necessary to act in the public interest, to develop personal responsibility and to achieve personal success.	3				X									
8	Socio-political knowledge module (cultural studies, psychology)	The purpose of the disciplines is to study the real processes of cultural creative activity of people creating material and spiritual values, to identify the main trends and patterns of cultural development, the change of cultural epochs, methods and styles, their role in the formation of man and the development of society, as well as to master the psychological knowledge for the effective organisation of interpersonal interaction, social adaptation in the sphere of their professional activity.	3			X										
Cycle of general education disciplines Elective component																
9	Fundamentals of anti-corruption culture and law	Purpose: to increase the public and individual legal awareness and legal culture of students, as well as the formation of a knowledge system and a civic position on combating corruption as an antisocial phenomenon. Contents: improvement of socio-economic relations of the Kazakh society, psychological features of corrupt behavior, formation of an anti-corruption culture, legal responsibility for acts of corruption in various fields.	5			X										
10	Fundamentals of economics and entrepreneurship	Purpose: To develop basic knowledge of economic processes and skills in entrepreneurial activities. Content: The course aims to develop skills in analyzing economic concepts such as supply and demand, and market equilibrium. It includes the basics of creating and managing a business, developing business plans, risk assessment, and	5												X	X

		strategic decision-making.													
11	Fundamentals of scientific research methods	The purpose of the discipline "Fundamentals of research methods" is the formation of students' skills and abilities in the field of methodology of scientific knowledge. Brief description of the discipline. Methodological foundations of scientific knowledge. The concept of scientific knowledge. Methods of theoretical and empirical research. Choice of the direction of scientific research. Stages of research work. Research topic and its relevance. Classification, types and tasks of the experiment. Metrological support of experimental studies. Computational experiment. Methods for processing the results of the experiment. Formulation of research results. Presentation of research work.	5			X									
12	Ecology and life safety	Purpose: formation of ecological knowledge and consciousness, obtaining theoretical and practical knowledge on modern methods of rational use of natural resources and environmental protection. Contents: the study of the tasks of ecology as a science, the laws of the functioning of natural systems and aspects of environmental safety in working conditions, environmental monitoring and management in the field of its safety, ways to solve environmental problems; life safety in the technosphere, emergencies of a natural and man-made nature.	5			X									
13	Basics of Financial Literacy	Purpose: formation of financial literacy of students on the basis of building a direct link between the acquired knowledge and their practical application. Contents: using in practice all kinds of tools in the field of financial management, saving and increasing savings, competent budget planning, obtaining practical skills in calculating, paying taxes and correctly filling out tax reports, analyzing financial information, orienting in financial products to choose adequate investment strategies.	5											X	X
		Cycle of basic disciplines University component													
14	Mathematics I	Цель: познакомить студентов с фундаментальными понятиями Purpose: to introduce students to the fundamental concepts of linear algebra, analytical geometry and mathematical analysis. To form the ability to solve typical and applied problems of the discipline. Contents_ Elements of linear algebra, vector algebra and analytical geometry. Introduction to the analysis. Differential calculus of a function of one variable. The study of functions using derivatives. Functions of several variables. Partial derivatives. The extremum of a function of two variables.	5								X				

15	Mathematics II	Purpose: To teach students integration methods. To teach you how to choose the right method for finding the primitive. To teach how to apply a certain integral to solve practical problems. Contents_ integral calculus of the function of one and two variables, series theory. Indefinite integrals, methods of their calculation. Certain integrals and applications of certain integrals. Improper integrals. Theory of numerical and functional series, Taylor and Maclaurin series, application of series to approximate calculations_	5								X				
16	Chemistry	Purpose: formation of knowledge on fundamental issues of general chemistry and skills of their application in professional activity. Summary Laws, theoretical propositions and conclusions that underlie chemical disciplines; properties and relationships of chemical elements based on the periodic law of D.I.Mendeleev and on modern ideas about the structure of matter; fundamentals of chemical thermodynamics and kinetics; processes in solutions; structure of complex compounds.	5											X	
17	Physics	Purpose:To form ideas about the modern physical picture of the world and scientific worldview, the ability to use knowledge of fundamental laws, theories of classical and modern physics. Contents_ physical fundamentals of mechanics, fundamentals of molecular physics and thermodynamics, electricity and magnetism, vibrations and waves, optics and fundamentals of quantum physics.	5	X											
18	Инженерная и компьютерная графика	Цель: Формирование у студентов знаний построения чертежа и умений разрабатывать графическую и текстовую конструкторскую документацию в соответствии с требованиями стандартов. Содержание: Студенты изучат стандарты ЕСКД, графические примитивы, геометрические построения, методы и свойства ортогонального проецирования, эпюр Монжа, аксонометрические проекции, метрические задачи, виды и особенности соединений, создание эскизов деталей и сборочных чертежей, деталирование, а также создание 3D сложных твердотельных объектов в AutoCAD.	5	X											
19	Geodesy	The purpose of the discipline: To study the geometric characteristics of the Earth's parameters with the definition of specific points in a three-dimensional coordinate system for the construction of graphical documentation of mining enterprises. Content: As a result of mastering the discipline, the student should be able to work with geodetic instruments, measure horizontal and vertical angles, distances, perform desk processing of field data to obtain reliable data on the terrain, ground structures, and other objects.	5					X				X	X		

20	Integrated information systems in mining	Purpose: mastering the practical use of information complexes for planning in the development of mineral deposits. Content: basic knowledge and skills in the use of technology and information systems for automatic planning in the development of mineral deposits for independent practical activities; ensuring the performance of calculations, analysis, synthesis and design, as well as mastery of software packages; primary skills in the preparation of working drawings.	5	X								X	X		
21	Fundamentals of Geology	"Fundamentals of Geology" is to teach students skills in studying the field methods of the material composition of the earth's crust, the ability to study and observe the processes that form the earth's crust. In the course of studying the course, students will get an idea of current theoretical developments that explain the formation of the universe, the solar system, the earth, the atmosphere, the hydrosphere, i.e. On the conditions for the origin of the geological environment	5			X									
22	Applied mechanics	Purpose: to master the basics of scientific knowledge in the field of solid mechanics by students and develop skills for their application in practical work in their specialty. Contents: Force vector and its components. Systems of forces. Methods for determining the movement of a point. The simplest motions of a rigid body. Plane motion of a rigid body. Complex point movement. Dynamics of a material point. Differential equations of motion of a material point. Dynamics of a system of material points. D'Alembert's principle for a material point.	5			X									
23	Shattering process	Purpose: to study the physical essence of the processes of explosive destruction of rocks in the extraction of solid minerals, technology and rules of technical and environmental safety in the production of blasting. Content: classification of methods of drilling boreholes and boreholes; classification of explosions, detonation, poisonous gases in the explosion; the field of application of explosives; initiating explosives; requirements for industrial explosives; methods and means of blasting; electronic schemes for switching charges of explosives.	5		X				X					X	X
24	Numerical 3D modeling of geomechanical processes	Purpose: to study the methods used in modeling geomechanical processes and methods of calculating the parameters of stress-strain state of rock massif. Content: geomechanical processes in rock massif, calculation of parameters of stress-strain state of rock massif, finite element method, discrete and boundary elements, measurement of physical parameters in modeling, computer modeling of geomechanical processes using such active learning methods as case studies, problem solving..	5	X				X				X	X		

25	Physics of rock mass	Purpose: to study the influence of physical, mechanical and chemical properties of rocks on mining operations. Content: compilation of rock strength passport using the Coulomb-Mohr method, mechanical properties of rocks, rock stresses and Deformation; acoustic, electrical, magnetic and thermal properties of rocks, the influence of external factors on these properties; use of active learning methods such as case studies, problem solving, brainstorming.	5	X												
26	Construction of mining enterprises	Purpose: training in the peculiarities of designing the construction of mining enterprises, in-depth study of technology (construction) of vertical, inclined and horizontal mine workings, and underground structures for various purposes. Content: technology of construction of mine shafts; dissection of the mine yard; technology of construction of horizontal and inclined mine workings; compiling a passport of drilling and blasting operations during the sinking of mine workings; fastening of mine workings; technology of uprising.	5		X	X			X					X	X
27	Thermodynamics and Hydromechanics	The purpose of teaching the discipline to students is to master the methods of obtaining, conversion, transfer and utilization of thermal energy in thermal power plants and knowledge in the theory and practice of application of the basic laws of hydromechanics, which will allow for the effective operation of technological equipment in the development of solid minerals. When studying the discipline you will be able to: study and learn to apply in practice the basic laws of obtaining and transformation of energy in technical devices; study the regularities of fluid or gas movement under the action of various disturbances (external mechanical loads, temperature, etc.); learn analytical and calculation-experimental methods to determine and evaluate the efficiency of thermal and hydraulic energy in technological equipment.	5											X	
28	Electrical engineering	The purpose of the discipline is the development of the theoretical foundations of electrical engineering, the acquisition of knowledge about the designs, principles of operation, parameters and characteristics of various electrical circuits and electrical devices, preparing the student to understand the principle of operation of modern electrical equipment.	5				X								
29	Financial and economic model of a mining enterprise	Purpose: to teach to perform technical and economic evaluation of options for the development of mining operations in market conditions and plan appropriate investments to reach the production capacity of the mining enterprise. Content: calculation of production costs; criteria for assessing the various costs and revenues; net present value, payback period of investments, the level of profitability of production,	5											X	X

		internal rate of return; structure and content of the financial and economic model of the mining enterprise.													
30	Fundamentals of Artificial Intelligence	Purpose: to familiarize students with the basic concepts, methods and technologies in the field of artificial intelligence: machine learning, computer vision, natural language processing, etc. Contents: general definition of artificial intelligence, intelligent agents, information retrieval and state space exploration, logical agents, architecture of artificial intelligence systems, expert systems, observational learning, statistical learning methods, probabilistic processing of linguistic information, semantic models, natural language processing systems.	5										X		X
31	Fundamentals of sustainable development and ESG projects in Kazakhstan	Purpose: the goal is for students to master the theoretical foundations and practical skills in the field of sustainable development and ESG, as well as to develop an understanding of the role of these aspects in the modern economic and social development of Kazakhstan. Contents: introduces the principles of sustainable development and the implementation of ESG practices in Kazakhstan, includes the study of national and international standards, analysis of successful ESG projects and strategies for their implementation in enterprises and organizations.	5										X	X	X
32	Legal regulation of intellectual property	Purpose: the goal is to form a holistic understanding of the system of legal regulation of intellectual property, including basic principles, mechanisms for protecting intellectual property rights and features of their implementation. Content: The discipline covers the basics of IP law, including copyright, patents, trademarks, and industrial designs. Students learn how to protect and manage intellectual property rights, and consider legal disputes and methods for resolving them.	5			X					X		X	X	X
		Cycle of basic disciplines **Elective component**													
33	Open-pit mining processes	Purpose of the discipline: studying the methods of creating surveying reference and surveying networks on the surface, mastering the methods of surveying measurements, mastering the skills of analysing surveying data and practical application of knowledge in engineering projects. Content: As a result of mastering the discipline the student must know and be able to perform a variety of surveying works on the ground with high accuracy and professionalism.	5		X				X	X				X	X
34	Deposit opening and development when underground mining	Purpose: to teach future specialists to justify and select methods of stripping and preparation, taking into account the mining and geological conditions of the field. Content: stages of underground development of mineral deposits, stripping workings, methods of stripping, advantages and disadvantages, conditions of application and	5			X									X

		methodology for selecting the method of stripping; activation of learning through the performance of feasibility studies of several options for stripping and sinking of mine workings.													
35	Deposit opening and devolopment when uranium undeground borehole	_reduction of the number of process wells due to uniform placement of geotechnological wells and acceleration of the uranium leaching process and increase of its concentration in the productive solution pumped to the day surface for processing. Content_ the essence of this method of new way of opening and exploitation of hydrogenic uranium deposits	5			X									X
36	Mechanics of underground structures	Purpose: teaching the regularities of interaction of underground mine workings and rock massif and calculation of stress-strain state of rock massif. Content: physical-mechanical, structural-mechanical and geomechanical models of rock massif; stress-strain state of rock massifs around mine workings; calculation schemes of interaction of rock massifs with underground structures; classification of structures of supports and linings; formation of load on the structures of underground structures.	5	X				X			X		X		X
37	General course of surveying	The purpose of the discipline: to study the methods of creating underground surveying support and survey networks, methods of measuring horizontal angles, methods of geometric orientation of underground surveys using modern equipment and technology. Content: As a result of mastering the discipline, the student must know and be able to perform geometric orientation of mine workings, be able to build mine workings in horizontal and vertical planes based on field data.	5	X		X		X			X	X	X		
38	Interconnection and planning of open cast mining processes	to study the relationship between technological processes in open pit mining. Content_ the impact of preparation of rocks for excavation on the productivity of excavation and loading operations in different mining and geological and mining engineering conditions	5		X	X			X	X				X	X
39	Underground mining operations processes	Цель: изучение процессов очистной выемки и проходки горных Purpose: studying the processes of cleaning excavation and sinking of mine workings in underground mining operations. Content: the main production processes of cleaning excavation and sinking of mine workings, means of complex mechanization, the conditions of their application, the choice and effective operation of equipment; performance of technological calculations, passport execution of processes of stripping, release, loading, delivery and management of rock pressure (ways of maintaining the cleaning and excavation space) with ensuring safety; simulation modeling.	5		X				X	X				X	X
40	Uranium deposits	Purpose: mastering the features of geotechnology of underground	5		X	X			X					X	X

	underground mining geotechnology	development of uranium deposits. Content: structure; methods of opening uranium deposits, their choice, main indicators; exploitation of uranium deposits, methods of determining the efficiency of exploitation of light leaching deposit, unacceptable leaching deposits; tamping of uranium deposits, existing methods; realization of underground in-situ leaching of uranium by physical and chemical geotechnology; process of block preparation and reagents used for completeness and intensity of reserves recovery.														
41	Underground construction facilities	Purpose: familiarization with the types of underground mine workings and structures built for various purposes, study of the differences of these underground facilities from each other, the peculiarities of their construction methods.Content: underground facilities erected in mining and national economy and industry, the main features of their construction; technology of conducting and fixing horizontal and inclined mine workings; construction of subway facilities; construction of tunnels.	5					X			X		X		
42	Mine surveying drawing	Goal: Mastering the skills of reading and performing mining-graphic drawings, developing spatial imagination, studying specialized programs Content: As a result of studying the discipline, the student learns the necessary techniques and skills for compiling, supplementing, editing, and designing surveying drawings, which are the final product of surveying works and serve as a graphical basis for the exploration of mineral deposits, design, operation, additional exploration, reconstruction and liquidation of mining enterprises. Master the skills of working in AutoCAD software.	5	X				X			X	X			
43	Opencast mine mining and transport equipment	Purpose: to master the principles of completing mining transport machines and equipment in the open-pit mining of solid minerals, depending on the mining and geological and mining conditions and the distance of cargo transportation. Content: To carry out open-pit mining operations, namely loading, moving and unloading of mined ore, mining and transport equipment is used: drilling, excavation-loading, transport and unloading (dumping) equipment. It includes a variety of excavators, dump trucks, bulldozers, winches, wagons, conveyors and other machines.	5		X		X							X	X
44	Mining-and-transport equipment of underground mines	Purpose: to master the principles of operation, design, technical capabilities of machines and equipment for drilling boreholes and wells, delivery and transport of mined minerals and waste rock, required communication and power equipment. Content: For the extraction of minerals a complex of equipment is used to automate the most complex processes of opening of underground deposits,	5		X		X							X	X

		extraction, concentration, transport of rock. It includes a set of technologically complex installations that help to automate the performance of basic and auxiliary operations: from stripping, loading and transporting of rock mass to laying of the mine workings.													
45	Shield tunneling complexes	Purpose: to teach the peculiarities of shield complexes application, constructions, details and principles of shield complexes operation. Content: classification of tunnel boring shields, conditions of application and prospects for their improvement; technological processes in shield tunneling; structural schemes and features, equipment and units of shield complexes; non-mechanized shield complexes; semi-mechanized shield complexes; mechanized shield complexes; ways of selecting shield types..	5		X		X							X	X
46	Surveying on the surface	Purpose of the discipline: studying the methods of creating surveying reference and surveying networks on the surface, mastering the methods of surveying measurements, mastering the skills of analysing surveying data and practical application of knowledge in engineering projects. Content: As a result of mastering the discipline the student must know and be able to perform a variety of surveying works on the ground with high accuracy and professionalism.	5	X		X					X	X	X		
47	Mineral deposits underground mining systems	Purpose: mastering the most progressive development systems for underground mining of ore, coal and polymetallic deposits on flat and upland terrain, respectively. Content: the order and sequence of mining and preparation, stripping and cleaning works; underground development systems for the development of ore and coal deposits on sloping, steeply sloping and steep deposits; cutting of the mine field into floors, sub-floors, blocks and faces depending on the conditions of occurrence, thickness and characteristics of the mineral.	5		X	X			X	X				X	X
48	Solutions hydraulics when uranium development	Purpose: to obtain knowledge about the production unit of in-situ in-situ leaching as a part of the productive horizon, which includes a group of adjacent elementary cells, simultaneously put into operation and worked out in a single hydraulic regime. Content: consistent familiarization with the types of fluid movement, the main hydraulic parameters of the flow, modes of fluid movement, the theory of determining the head loss and fluid flow through the orifices, nozzles, hydraulic calculations of pipelines, the basics of the theory of fluid filtration in rocks.	5		X									X	X
49	Technology of construction of vertical mine workings	Purpose: mastering the basic issues of technology of construction of vertical mine workings. Content: preparatory period, shaft sinking operations in the shaft in normal and difficult mining and geological conditions, as well as works on deepening of shafts; emphasis is	5	X	X			X	X				X	X	X

		placed on the selection and justification of technological schemes of construction, drilling and blasting operations, methods of ventilation and fixing of excavations, loading and lifting of rocks to the surface based on the latest achievements of theory and practice.														
50	Mathematical processing of surveying and geodetic measurements	The course of mathematical processing of mine surveying and geodetic measurements is based on obtaining and consolidating knowledge on the elements of probability theory, classification of measurements, random measurement errors, the law of their distribution, properties of random errors, measures of accuracy of measurement results, justification of the least squares method, on measurement weights, statistical population and distribution, statistical studies of a number of random measurement errors, equalizing calculations	5	X				X			X	X			
51	Opening of career fields	Purpose: study of methods, systems and schemes of opening of open pit fields in the periods of construction and operation of open pits to the final depth with the reduction of mining and capital works and transportation costs. Content: separately considered variants of stripping in the tracing of opening workings on gentle, sloping and steeply falling deposits on flat terrain and highland deposits, taking into account the practice of operation of advanced open pits of the world.	6			X										X
52	Subsoil use contract and license	Purpose: to teach specialists to prepare a set of documents for the conclusion of a contract and license for subsoil use with the competent authorities. Content: based on the technical project of field development the main tasks are aimed at the allocation of the contract area, drawing up a work program with a financial and economic model of the mining enterprise. At the same time, special attention is paid to the write-off of field reserves on the basis of the mining unit approved in the project.	6			X									X	
53	Geotechnological methods of development of solid minerals	Purpose: to show promising non-traditional geotechnology using its capabilities to develop new geotechnological methods of mining. Content: mechanical processes of mineral extraction through the processes of destruction and de-strengthening of rocks; thermal processes of extraction by heating the massif to the required temperature transition heat carrier, high-frequency electromagnetic field, high-density electric current, in-situ burning hearth; recent advances and prospects of geotechnological methods of development of solid minerals.	6		X	X			X						X	X
54	Special ways of building underground structures	Purpose: to study special methods of construction of underground structures, including the implementation of an additional set of	6	X	X			X	X				X	X	X

		measures prior to the start of mining operations in non-cohesive, weakly stable water-bearing soils or in strong fractured and water-bearing rocks. Content: to create safe, comfortable conditions for rock excavation and erection of temporary or permanent support without disturbing the integrity of the surrounding massif and impact on underground utilities; application of rock tamping, encasing supports and rock freezing.													
55	Mine surveying for the construction of mines	The purpose of the discipline: to study the methods of carrying out design data in kind when laying a mine shaft and building surface structures on the earth's surface, compiling data for terrain planning, splitting and fixing the centers and axes of mine shafts, transferring design contours and axes of structures to the terrain, servicing work on installing a copra and installing lifting equipment. Content: As a result of mastering the discipline, the student must know and be able to perform the elements of center work, tasks for underground mining, and conduct surveying documentation of filming.	6	X		X		X			X	X	X		
56	Conducting mining operations at quarries	Purpose: to study the methods of open mine workings as a set of technological processes performed in a certain sequence to create a cavity in the rock massif of the required size and shape and to ensure its safety for the period of further operation. Content: in addition to the traditional inclined mine workings for road and rail transport rational variants of steep mine workings for conveyor and skip modes of transport are studied.	5	X	X				X	X		X	X	X	
57	Rock conditions management	Purpose: to study a set of measures to purposefully transfer the massif into a known stable, close to the limit or unstable state. Content: carried out by changing in the process of development of the form, parameters and duration of rock exposure, as well as changes in physical and mechanical properties of rocks, providing economic and safe mining operations; practice of mining operations in conditions of limit state of the rock massif..	5	X				X			X		X		
58	Field development in specific conditions	Purpose: to study the development of solid mineral deposits in special conditions, including poorly stable rock masses, large inflow of ground and underground water, the propensity of minerals to spontaneous combustion. Content: the practice of safe and efficient development in special conditions at mines, mines and quarries, the sequence of works to localize the flooding of underground mine workings, mining operations in waterlogged massifs.	5		X				X					X	X
59	Construction of underground hydraulic structures	Purpose: technical and economic analysis and selection of parameters of hydraulic structures, production technology and organization of underground works. Content: includes systematized material on types	5	X	X			X	X				X	X	X

		and designs of underground hydraulic structures and their layouts in complex hydrosystems, engineering and geological studies, construction materials for underground structures, field and model studies of structures, calculation of underground hydraulic structures taking into account the prediction of long-term stability, especially in zones of geological disturbances.													
60	Surveying-geodesy instruments	Purpose: to study the design of optical and mechanical surveying and geodetic instruments, the features of modern electronic devices and work with satellite and laser-electronic technologies. Content: as a result of studying the course, the student should know the principles of device design and operation of instruments, be able to carry out a set of field and desk work in the performance of surveying and geodetic measurements.	5	X								X			
61	Resource-saving and low-waste technology on ore mines	Purpose: to disclose the reserves for the development of resource-saving and low-waste technologies at ore pits. Content: resource intensity of mining products; problems of rational use of natural resources in mining production; the state and tasks of rational use of the mineral resource base of the country; improving the quality and value of mineral raw materials and reducing the bordering content of minerals in the conditions; quantitative and qualitative losses of minerals and their assessment.	5		X	X			X					X	X
Cycle of specialised disciplines University component															
62	Aerology of consessions	to study the properties of the atmosphere of mines and mines, the laws of air movement, the transfer of gaseous impurities, dust and heat in the mine workings and the adjacent rock massif. Content_ measures to ensure safe working conditions for workers, methods of ventilation of mines, tunneling faces and quarries	5									X		X	X
63	Bases of mining (Introduction to specialty)	Purpose: mastering of mining terminology and peculiarities of mining operations at open pit, underground and borehole mining of mineral deposits. Content: the main production processes in the development of deposits by open pit, underground and borehole mining of minerals on the basis of existing and prospective means of mechanization; basic	5		X	X			X						

		concepts of processing and beneficiation of mined minerals; representation of mine workings and means of mechanization in working drawings.														
64	Processing and enrichment of minerals	Purpose: to study a set of methods and processes of primary processing of mineral raw materials for the extraction of valuable minerals from waste rock, as well as the mutual separation of valuable minerals. Contents: Physico-chemical bases of mineral processing. Processes, devices and technologies for the preparation of mineral raw materials for the separation of minerals. Processes, devices and technologies for the enrichment and processing of minerals. Technically and environmentally safe ways of working on the processing of minerals.	4		X									X	
Cycle of specialised disciplines Elective component																
65	Industrial explosives	Purpose: training of explosive engineers in the field of explosive engineering, acquisition of necessary skills for independent practical activity. Content: explosives (explosives) - nitroglycerine explosives; ammonium nitrate explosives; hexogen, nitroglycerine, nitroglycol; granulite; means of detonation - detonating cords; primer detonators and electric detonators; waveguides, electronic detonation; peculiarities of detonation of industrial explosives, charging machines; drawing up passports BVR; modern explosives for waterlogged and dry wells.	5													X
66	Design and computer style for mining operations development plans	Purpose: to study the concept of development plan for underground mining, its structure and computerized design. Content: to calculate reserves using office and special programs; to build a calendar plan; to calculate losses and dilution; to master the basic skills of using special software for computer design of mining development plan; to determine the degree of exploration of the field.	5	X					X			X	X	X		
67	Mining drawing when uranium deposits underground mining	Purpose: to learn how to prepare mining graphic materials for in-situ borehole leaching of uranium using special software. Content: to calculate reserves of uranium deposits using office and special programs; to master basic skills of using special software for computer processing of stripping methods and preparation methods for in-situ in-situ uranium leaching; to determine the degree of suitability of uranium deposits.	5	X								X	X			
68	Technology of construction of tunnels	Purpose: training in modern technologies of tunnel construction for various purposes. Content: establishing the feasibility of tunneling depending on the strength of rocks; technologies of tunnel construction by mining, shield, open, drilling and blasting and special	5		X				X		X			X	X

		methods; organization and planning of tunnel and subway construction; repair, reconstruction and restoration of tunnels.													
69	Ways to support underground structures	Purpose: the study of methods of fastening of mine workings and underground structures, passed in different mining and geological conditions, the choice of types of fastenings and design of their structures, methods of erection of fastenings. Content: the concept of fastenings and the process of fastening; classification of fastenings of mine workings and the requirements for them; fastening of horizontal, inclined and vertical mine workings; technology and equipment for the construction of fastenings.	5					X	X		X				
70	Geomechanics	Purpose: geomechanics is aimed at obtaining knowledge about the mechanical properties and mechanical condition of a rock mass and the processes of deformation and destruction (geomechanical processes) occurring in it under certain natural conditions under the influence of mining (technological) factors. Content: with the use of modern geophysical instruments, it will allow monitoring of the movement of the rock mass relative to the outcrops of the mine workings at existing mining enterprises..	5		X			X			X		X		
71	Technological complexes of open cast mining operations	Purpose: to establish a close relationship between the technology of open pit mining with the applied complexes of equipment to select the most rational combination in specific mining and geological and mining engineering conditions. Content: technological and structural classification of technological complexes of equipment; completion of equipment for preparation of rocks for excavation; interrelationships of excavation-loading and transportation equipment, transportation and dumping equipment, taking into account auxiliary equipment; justification of productivity of formed cargo flows and production capacity of the open pit as a whole.	5		X	X	X			X	X				X
72	Underground mines air supply	Purpose: study of the methodology of calculations of dust and gas emission intensity, the required amount of air for ventilation, calculation of the ventilation network of the tunnelling section with the calculation of all types of resistance. Content: determination of the amount of air required for ventilation of the mine on the basis of establishing the sources of dust emission from mines, selection of the required mine ventilation systems and control of dustiness of mine air and their size.	5						X					X	X
73	Geotechnological wells drilling and operation	Objective: to master the theory and practice of drilling of production and geotechnological wells in relationship with the development of solid minerals. Content: development of drilling of geological exploration wells; methods of drilling of production and	5		X	X			X		X			X	X

		geotechnological wells; varieties of machines and equipment for drilling of production and geotechnological wells; peculiarities of preparation for operation of production and geotechnological wells of uranium deposits; creation of cavities in the bottom hole.													
74	Calculation of the design of underground structures	Purpose: teaching methods of calculation and justification of structures of underground structures, the study of methods of calculation of structures of lining and fastenings of underground structures. Content: the mechanism of interaction between the support and the rock mass; normative recommendations for the classification and determination of loads; basic requirements for the support, support vertical shafts of mines; calculation of nabryzgbetonnyh, monolithic, anchor, tubing, block, frame and panel structures.	5	X				X			X		X		
75	GIS cartography in mining	Purpose: To study the mathematical basis of maps and types of cartographic projections for compiling land use maps, and land cadastral plans. Contents: To study methods for determining distortions on maps of angles, shapes, areas to assess the quality of cadastral plans and maps. To master cartographic methods of depicting the relief and the situation for compiling agrochemical and agroclimatic maps in solving various land management problems, in assessing natural resources and land.	5	X				X			X	X	X		
76	Open development of building materials	Purpose: mastering of science-based methods of development of construction materials. Content: ensuring high technical and economic performance of mining enterprises, rational use of resources and environmental protection; purpose of mining production of construction materials in quarries.	5		X				X					X	X
77	Technology and complex mechanization of underground mining	Purpose: To ensure that the right of responsible management of underground mining operations is granted on the basis of the study of technology and organization of production of cleaning and tunneling works. Content: shows the close relationship between the technology used and the development systems depending on the mineralization conditions, the stability of the host rocks and the value of the minerals extracted; describes in more detail the production processes of cleaning excavation and the methods of ore delivery to the day surface.	5		X	X			X	X	X			X	X
78	Equipment of geotechnological fields at uranium dillhole in situ leaching	Purpose: study of the main methods of controlling injection, pumping and auxiliary wells during in-situ in-situ uranium leaching. Content: geophysical studies of wells; methods of determining well disturbances, flowing of process solutions, filter and near-filter zone colmatization; designs of pumping and injection pumps, system of applied pipes; types of repair and remedial works of geotechnological	5		X	X	X							X	X

		wells; activation of training on special simulators.													
79	Design of construction of mining facilities	Purpose: to master knowledge on the basics of design and construction of mining buildings and structures, construction technologies, diverse in purpose and structural design of buildings and structures. Content: requirements for the design and construction of buildings and structures on the surface of mines; elements of structures of mining buildings; general plan of the surface of the mine; copra, general information about copra, the purpose of copra.	5		X	X			X			X		X	X
80	Mine surveying at open pit mining	Purpose: during the course, the student must demonstrate the ability to analyze, synthesize and design geodetic measurements and planning work in the process of open-pit mining of mineral deposits, as well as be able to calculate costs. Content: as a result of studying the discipline, the student must master the planning of the development of minerals in an open way and the performance of surveying measurements and calculations during the trenches, the implementation of the project and the calculation of the volume of the ways of descent into the quarry, the organization and conduct of work on the planning of dredging developments	5			X		X			X	X	X		
81	Prospective and current planning of open cast mining operations	Purpose: planning the volume of mineral production of the required quality as a whole in the quarry and separately for each unit of excavation and loading equipment with minimization of the current stripping ratio. Content: methods of planning open-pit mining operations using information complexes and the practice of formation of mining plans taking into account the mining and geological, mining engineering, technological and economic conditions of field development.	5	X	X	X			X	X		X	X	X	X
82	Product guality management	Purpose: study of the processes of stabilization of the quality of commercial products and ore charge at in-pit stockpiles. Content: averaging the quality of mined mineral raw materials depending on the content of the useful component by treatment blocks; ore charge before shipment to the processing plant; averaging and loading complexes; work with the field databases in the preparation of technological cards of faces.	5						X				X		X
83	Technology and mechanization of piling works	Purpose: mastering the technology and mechanization of backfilling works on the basis of its preparation, delivery and placement in the excavated space of the clearance excavation. Content: the most rational compositions of backfill material depending on the characteristics of the host rocks, methods of their preparation and laying; determination of strength characteristics of backfill materials, areas of application of different backfill, modern materials and	5					X	X		X			X	X

		additives to improve the characteristics of backfill materials.													
84	Designing of blasting operations	Purpose: training in the main directions of blasting design in the mining industry, training of highly qualified specialists performing blasting operations. Content: design documentation of blasting operations in mining; methods of drafting blasting projects in open and underground mining operations; compilation of passports and blasting projects when sinking underground mine workings; ensuring industrial safety of blasting operations.	5		X	X			X			X		X	X
85	Designing of construction of underground mining enterprises	Purpose: training of specialists in the field of mining, mastering the scientific and practical basis for the design of construction of underground structures. Content: methods of designing parameters of individual underground facilities; design methods and methods of construction of the most complex mine facilities and other underground structures (mine shafts, the interface of the shaft with the mine yard, mine yard chambers); optimization of the location of facilities near the shaft yard.	5		X	X			X			X		X	X
86	Mine Survey of underground development systems	The purpose of the discipline: to study the methods of performing geometric orientation from the lower horizon of an underground mine to the overlying horizon, conducting mine workings with counter faces, performing surveying measurements of mine workings and production volumes using the example of underground mining systems. Content: As a result of mastering the discipline, he must be able to solve standard surveying tasks on a geometric basis in relation to the conditions of underground mining..	5			X		X			X	X	X		
87	Reclamation of disturbed lands on mines	Purpose: in accordance with environmental requirements to provide knowledge on the restoration of land disturbed by mining operations. Content: production of landscape restoration works; features of selective formation of dumps with regard to the requirements for reclamation; requirements for the reclamation of excavated space of open mine workings; technical and economic assessment of the effectiveness of land reclamation; comprehensive assessment of the state of disturbed lands and the development of recommendations for improving reclamation work at mining enterprises	5		X	X			X					X	X
88	Layout of underground mines plan	Purpose: to study the basics of design of underground development of mineral deposits. Content: basic documents regulating design and norms of technological design; principles of organization, types and order of design work; imparting skills in drafting assignments for design, feasibility study of the feasibility of changes in mining technology; preparation of the mining part of the project and author's support.	5		X	X			X			X		X	X

89	Design of uranium deposits	Purpose: to study the fundamentals of designing the development of hydrogene uranium deposits. Content: establishment of the optimal deep well for the full recovery of the deposit reserves, their number and depth of location, as well as annual productivity, taking into account round-the-clock operation; determination of the life of the well, taking into account their number, mineral reserves and the needs of the farm; justification of the full recovery of the deposit reserves by the recommended technology of uranium leaching.	5		X	X			X			X		X	X
90	Technology of construction of horizontal and inclined mine workings	Purpose: to provide theoretical knowledge and practical recommendations on technologies of construction of underground horizontal and inclined mine workings of mining enterprises for various purposes. Content: definitions of cross-sectional shapes and basic parameters of horizontal and inclined mine workings for various purposes; technological schemes of construction of horizontal and inclined mine workings; technological operations of mining workings.	5		X				X		X			X	X
91	Geometry of subsoil	The purpose of the discipline: To study the theory and practice of mathematical modeling of field indicators, the construction of mining and geometric models based on geological surveying surveys and source documentation. Content: As a result of mastering the discipline, the student should be able to solve various mining and geometric problems for the geometrization of folded faults, tectonic disturbances and fractures of a rock mass, to determine the capacity of a deposit, the construction of toposurfaces and mathematical actions with them	5	X				X			X	X			
92	Design of ore and coal mines	Purpose: studying the basics of design of ore and coal pits. Content: basic documents governing design; regulatory documents; principles, types of organization and procedure for design work; compilation of design tasks, performance of feasibility study of construction initiative, reconstruction and technical re-equipment; allocation of construction queues and start-up complexes, preparation of the mining part of the project and author's support.	5		X	X			X			X		X	X
93	Mines conservation	Purpose: familiarization with the procedures of liquidation and preservation of mines. Content: legislative acts and regulatory documents on liquidation and preservation of enterprises, technical measures in liquidation and preservation of enterprises, basics of design and design solutions for technical processes and operation in liquidation and preservation of enterprises, technical and economic indicators in liquidation and preservation of enterprises in the underground development of mineral deposits.	5			X									X
94	Uranium deposits	Purpose: to study the program of conservation of uranium mining	5			X									X

	conservation	enterprises and elimination of the consequences of uranium deposits development. Content: environmental impact of the consequences of uranium deposits development; neutralization of production wastes and their disposal; skills of drawing up a passport of uranium deposit conservation after extraction of balance reserves and its implementation in accordance with the long-term national program of rehabilitation of contaminated territories.														
95	Reconstruction of mines and underground structures	Purpose: to master the principles and norms of modern design of construction (reconstruction) of underground structures and use the acquired knowledge in the subsequent engineering activity. Content: general information about underground structures; the main reasons for reconstruction; ways and methods of reconstruction of underground construction objects; reconstruction of excavations interfacing with vertical shafts; repair and restoration of vertical, horizontal and inclined mine workings.	5		X	X				X	X			X	X
96	Mine survey software	Purpose of the discipline: obtaining knowledge of modern methods and means of computer technology surveying support at mining facilities, skills in the field of technology processing surveying information to solve production problems using specialized software. Content: after completing the course, the student should be able to independently solve problems arising in surveying support and operation of deposits, quarries and mines, perform engineering calculations and work in specialized software.	5	X				X			X	X	X		
97	Systems of open development of mineral deposits	Purpose: to teach science-based methods of selection and justification of the system of development of mineral deposits. Content: parameters and indicators of systems of open pit mining; justification of the order of field development, the relationship of stripping, mining exploitation and mining preparation works; deep and continuous systems of open pit mining; ensuring high technical and economic performance of the open pit, reasonable use of resources and environmental protection.	5		X	X			X					X	
98	Sheet deposits underground mining	Purpose: study of effective methods of underground development of reservoir deposits. Content: in connection with the lack of the need to leave the integrity of minerals schemes of stripping, preparation and development systems of reservoir deposits have their own features of underground development of deposits and require an assessment of the degree of their manufacturability; the basics of organization and technical means of preparatory and cleaning works.	5		X	X			X	X				X	X
99	Underground development of indigenous and alluvial	Purpose: to determine the feasibility of development of primary and placer deposits with the choice of technology for their extraction from the subsurface. Content: in what cases it is advisable to design	5		X	X			X	X				X	X

	deposits	processing plants with a full cycle of processing at gross excavation of rock mass; methods of sampling placers taking into account their side content; establishment of stripping and preparation of mine fields and the order of mining depending on the completeness of extraction of all reserves with minimization of dilution													
100	Technology of construction of urban underground structures	Purpose: imparting knowledge and skills necessary for independent creative problem solving related to the implementation of technological processes of construction of urban underground structures for various purposes. Content: advanced techniques and technology to increase the pace of construction and labor productivity, improve the quality of work, reduce costs and rational use of labor resources; technological regulations for the implementation of innovations in the construction of urban underground structures.	5		X			X	X		X			X	X
101	Mine surveying of the construction of tunnels	Purpose: knowledge of regulatory documents and basic rules for conducting surveying work on the construction of the subway and tunnel. Content: as a result of studying the discipline, the student must master determining the position of coordinates in the project plan, transferring the angle and distance of the project to the surface, performing design work, calculating attenuation curves in tunnels and measuring the direction to underground mining, as well as performing work on surveying a straight-line station conveyor	5			X		X			X	X	X		
102	Advanced mining technologies in deep and ultra-deep quarries	Purpose: to introduce students to the implementation of research on the basis of optimization algorithms and software developed at the department of “Mining Engineering”. Content: the establishment of optimal parameters of the boundaries of effective application of cyclic-flow technology, the final depth of open pits, the parameters of steeply sloping layers, automated establishment of optimal volumes of mining operations and parameters of reworking without variance of sides with the use of innovative transportation devices.	5	X	X	X			X	X		X	X	X	X
103	Combined field development methods	Purpose: to teach to set and choose directions for solving problems of transition from open pit to underground method of development of deep-seated ore deposits. Content_ justification of the technology of mining of the open-underground tier with redistribution of profits for the construction of the required underground facilities	5		X	X			X		X	X	X	X	X
104	Industrial safety of blasting operations	Purpose: familiarization with professional terminology, methods of blasting, principles of calculations of their parameters, technology and safety rules for blasting. Content: personnel for blasting operations; procedure for granting the right to direct blasting operations; general rules for handling of explosives; obtaining permits for the right to carry out blasting operations; procedure for storage, accounting,	5			X			X					X	

		transportation, use, testing and destruction of explosives.													
105	Basics of laser scanning	Purpose: To study the principle of operation of terrestrial laser scanners, the sources of errors in laser scanning and technological schemes of terrestrial laser scanning. Contents: To master the methods of external orientation of scans and the technique of laying scanner passages. Learn how to apply scanning technology in solving problems in geodesy, construction, architecture and in the oil and gas industry.	5	X				X			X		X		
106	Hydro-mechanization of mining of construction rocks	Purpose: to teach how to make recommendations on the design processes of hydraulic and geotechnical development of methods of mineral disposal. Content: includes the theoretical basis and development of hydromechanized methods of extraction of construction rocks in open pits; processes of hydromechanization of open-pit mining operations and ensuring the preparation of rocks for erosion; the impact of technology on the choice of means of control and automation of hydromechanization processes.	5		X				X					X	X
107	Special methods of conductieg open cast mining operations	Purpose: to get knowledge on special non-traditional methods of open-pit mining as an alternative in special conditions of their production. Content: application of rope suspended roads, milling harvesters, steeply inclined conveyors, transportation systems for deep open pits with rock lifting in skips with variable angle of inclination, in the zone of deposit reserves reworking with minimum side separation of innovative interstage transloaders, hydraulic transport.	5		X	X			X					X	X
108	Special questions of conducting underground mining works	Purpose: familiarization with the peculiarities of mining and cleaning works in complex mining and geological and mining engineering conditions with the impact of blasting on rock excavation. Content: determining the parameters of fan sets of wells, taking into account their undercharging and zone, characteristics of the flight of individual pieces of rock, calculating the estimated determine the deceleration intervals between rows and fans of wells and take into account the negative results of explosions of borehole charges with the establishment of seismically safe distances on the transmission of detonation, the zone of protection of lightning rods, skills in drawing up ventilation plans.	5		X	X			X					X	X
109	Special methods for the development of uranium deposits	Purpose: mastering of special technologies of underground and microbiological leaching of uranium deposits while transforming them into a mobile state and extracting it to the surface. Content: methods and conditions of effective leaching of hydrogenic uranium deposits by underground borehole method; expansion of bacterial leaching on an industrial scale through the study of uranium recovery from sulfide	5		X	X			X					X	X

		and sulfide-oxidized ores; activation of the learning process through laboratory research.														
110	Special drilling and blasting operations	Purpose: to teach effective and safe methods of conducting special drilling and blasting operations at construction sites for various purposes. Content: technologies of special drilling and blasting operations; methods of drilling and blasting in construction; contour blasting in transportation and hydraulic engineering construction; technologies of blasting operations in urban conditions and in the reconstruction of enterprises (drilling and blasting operations in the dismantling of foundations and monolithic reinforced concrete structures, collapse of buildings and structures).	5		X	X			X					X	X
111	Applied geodesy	Purpose: To study the methods of geodetic works when accompanying the design, construction and operation of engineering structures. Contents: Master the processing and evaluation of the accuracy of geodetic information and the construction of the initial basis on the construction site. To analyze the composition and organization of geodetic works in the design of structures; to argue for the use of methods and means when transferring the construction project to nature; organize geodetic monitoring of buildings and structures during their operation.	5			X		X			X	X			

5 The curriculum of the educational program

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

SATBAYEV UNIVERSITY

APPROVED
Chairman of the Management Board-
Rector of KazNRTU named after K.Satpayev
M.M. Begentaev
«__» ______ 2024 y.

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

Educational program 6B07205 - "Mining engineering"
Group of educational programs B071 - "Mining and extraction of minerals"

Form of study: full-time | Duration of study: 4 years | Academic degree: Bachelor of Engineering and Technology

Discipline code	Name of disciplines	Cycle	Total amount in credits	Total hours	classroom volume of lek/lab/pr	SIS (including TSIS) in hours	Form of control	Allocation of face-to-face training based on courses and semesters							
								I course		II course		III course		IV course	
								1 semester	2 semester	3 semester	4 semester	5 semester	6 semester	7 semester	8 semester
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)															
M-1. Module of language training															
LNG108	Foreign language	GED, RC	5	150	0/0/3	105	E	5							
LNG108	Foreign language	GED, RC	5	150	0/0/3	105	E		5						
LNG104	Kazakh (Russian) language	GED, RC	5	150	0/0/3	105	E	5							
LNG104	Kazakh (Russian) language	GED, RC	5	150	0/0/3	105	E		5						
M-2. Module of physical training															
KFK 101-104	Physical Culture	GED, RC	8	240	0/0/8	120	Difcredit	2	2	2	2				
M-3. Module of information technology															
GEN 429	Engineering and computer	BD, UC	5	150	1/1/1	105	E	5							
CSE677	Information and communication technologies (in English)	GED, RC	5	150	2/1/0	105	E				5				
M-4. Module of socio-cultural development															
HUM101	History of Kazakhstan	GED, RC	5	150	1/0/2	105	SE		5						
HUM132	Philosophy	GED, RC	5	150	1/0/2	105	E				5				
HUM120	Socio-political knowledge module (sociology, politology)	GED, RC	3	90	1/0/1	60	E				3				
HUM134	Socio-political knowledge module (culturology, psychology)		5	150	2/0/1	150	E			5					
M-5. Module of anti-corruption culture, ecology and life safety base															
HUM136	Fundamentals of Anti-Corruption Culture and Law	GED, CCH	5	150	2/0/1	150	E			5					
MNG489	Fundamentals of Economics and Entrepreneurship														
HPP128	Fundamentals of scientific research methods														
CHE656	Ecology and life safety														
MNG564	Basics of Financial Literacy														
CYCLE OF BASIC DISCIPLINES (BD)															
M-6. Module of physical and mathematical training															
MAT 101	Mathematics I	BD, UC	5	150	1/0/2	105	E	5							
PHY 468	Physics	BD, UC	5	150	1/1/1	105	E	5							
MAT 102	Mathematics II	BD, UC	5	150	1/0/2	105	E		5						
M-7. Module of basic training															
MAP519	Geodesy	BD, UC	5	150	1/0/2	105	E	5							
PHY107	Applied mechanics	BD, UC	5	150	2/0/1	105	E			5					
CHE495	Chemistry	BD, UC	5	150	1/1/1	105	E			5					
GEO475	Fundamentals of Geology	BD, UC	5	150	2/1/0	105	E					5			
ELC186	Electrical engineering	BD, UC	5	150	1/1/1	105	E						5		
TEC614	Thermodynamics and hydromechanics	BD, UC	5	150	2/0/1	105	E						5		
AAP167	Educational practice	BD, UC	1						1						
M-8. Mining support module															
MIN447	Physics of rock mass	BD, UC	5	150	1/2/0	105	E				5				
MIN442	Shattering process	BD, UC	5	150	1/1/1	105	E			5					
MIN448	Construction of mining enterprises	BD, UC	5	150	1/1/1	105	E				5				
MIN449	Open-pit mining processes	BD, CCH	5	150	1/0/2	105	E				5				
MIN450	Deposit opening and devoloment when underground mining				2/0/1										
MIN451	Deposit opening and devolopment when uranium undeground borehole				2/0/1										
MIN452	Industrial explosives				1/1/1										
MIN459	Mechanics of underground structures				2/0/1										
MAP530	General course of surveying				1/0/2										
MIN460	Interconnection and planning of open cast mining processes	BD, CCH	5	150	2/0/1	105	E					5			
MIN454	Underground mining operations processes				2/0/1										
MIN461	Uranium deposits underground mining geotechnology				2/0/1										
MIN462	Underground construction facilities				2/0/1										
MAP529	Mine surveying drawing				0/0/3										
CSE831	Fundamentals of Artificial Intelligence				1/0/2										

TEC186	Opening mine mining and transport equipment	BD, CCH	5	150	2/0/1	105	E					5			
PED147	Mining and transport equipment of underground mines				2/0/1										
MIN455	Shield tunneling complexes				2/0/1										
MAP531	Mine surveying work on the surface				1/0/2										
MNG562	Legal regulation of intellectual property				2/0/1										
M-9. Mining production module															
MIN443	Numerical 3D modeling of geomechanical processes	BD, UC	5	150	1/2/0	105	E					5			
MIN109	Integrated information systems in mining	BD, UC	5	150	1/2/0	105	E								5
MIN445	Financial and economic model of a mining enterprise	BD, UC	5	150	1/1/1	105	E								5
MIN466	Resource-saving and low-waste technology on ore mines	BD, CCH	5	150	2/0/1	105	E						5		
MIN467	Mineral deposits underground mining systems				2/0/1										
MIN468	Solutions hydraulics when uranium development				2/0/1										
MIN469	Technology of construction of vertical mine workings				2/0/1										
MAP532	Mathematical processing of surveying and geodetic				1/0/2										
MIN511	Opening of career fields	BD, CCH	6	180	2/0/2	120	E						6		
MIN512	Subsoil use contract and license				2/0/2										
MIN510	Geotechnological methods of development of solid minerals				2/0/2										
MIN513	Special ways of building underground structures				2/0/2										
MAP535	Mine surveying for the construction of mines				1/1/2										
MIN516	Conducting mine workings at quarries	BD, CCH	5	150	1/0/2	105	E							5	
MIN520	Rock conditions management				2/0/1										
MIN517	Fields development in special conditions				2/0/1										
MIN519	Construction of underground hydraulic structures				2/0/1										
MAP520	Surveying - geodetic instruments				1/0/2										
MNG563	Fundamentals of sustainable development and ESG projects in Kazakhstan				2/0/1										
CYCLE OF PROFILE DISCIPLINES (PD)															
M-10. Module of professional activity															
MIN101	Bases of mining (Introduction to specialty)	PD, UC	5	150	1/0/2	105	E		5						
MET641	Processing and enrichment of minerals	PD, UC	4	120	2/1/0	75	E					4			
MIN481	Aerology of consessions	PD, UC	5	150	2/1/0	105	E							5	
M-11. Mine design module															
MIN463	Special methods of conductieg open cast mining operations	PD, CCH	5	150	2/0/1	105	E					5			
MIN464	Design and computer style for mining operations development plans				1/0/2										
MIN465	Mining drawing when uranium deposits underground mining				1/0/2										
MIN456	Technology of construction of tunnels				2/0/1										
MIN457	Ways to support underground structures				2/0/1										
MAP524	Geomechanics				1/0/2										
MIN470	Technological complexes of open cast mining operations	PD, CCH	5	150	2/0/1	105	E						5		
MIN131	Underground mines air supply				2/0/1										
MIN471	Geotechnological wells drilling and operation				2/0/1										
MIN472	Calculation of the design of underground structures				2/0/1										
MAP528	GIS cartography in mining				1/0/2										
MIN473	Open development of building materials	PD, CCH	5	150	1/0/2	105	E						5		
MIN474	Technology and complex mechanization of underground mining				2/0/1										
MIN475	Equipment of geotechnological fields at uranium dillhole in situ leaching				2/0/1										
MIN476	Design of construction of mining facilities				2/0/1										
MAP521	Mine surveying at open pit mining				1/0/2										
MIN487	Prospective and current planning of open cast mining operations	PD, CCH	5	150	2/0/1	105	E							5	
MIN488	Product guality management				2/0/1										
MIN489	Technology and mechanization of piling works				2/0/1										
MIN491	Designing of blasting operations				2/0/1										
MIN492	Designing of construction of underground mining enterprises				2/0/1										

MAP525	Mine survey of underground development systems				1/0/2										
MIN493	Reclamation of disturbed lands on mines	PD, CCH	5	150	2/0/1	105	E							5	
MIN 494	Layout of underground mines plan				2/0/1										
MIN501	Layout of underground deposits plan				2/0/1										
MIN495	Technology of construction of horizontal and inclined mine workings				2/0/1										
MAP523	Geometry of subsoil				1/0/2										
MIN496	Design of ore and coal mines	PD, CCH	5	150	1/0/2	105	E							5	
MIN497	Mines conservation				2/0/1										
MIN498	Uranium deposits conservation				2/0/1										
MIN499	Reconstruction of mines and underground structures				2/0/1										
MAP527	Mine survey software				1/0/2										
MIN500	Systems of open development of mineral deposits	PD, CCH	5	150	1/0/2	105	E							5	
MIN441	Sheet deposits underground mining				2/0/1										
MIN432	Underground development of indigenous and alluvial deposits				2/0/1										
MIN433	Technology of construction of urban underground structures				2/0/1										
MAP526	Mine surveying of the construction of tunnels				1/0/2										
M-12. R&D module															
MIN509	Advanced mining technologies in deep and ultra-deep quarries	PD, CCH	5	150	1/1/1	105	E								5
MIN526	Combined field development methods				2/0/1										
MIN140	Industrial safety of blasting operations				2/0/1										
MAP499	Basics of laser scanning				1/0/2										
MIN522	Hydro-mechanization of mining of construction rocks	PD, CCH	4	120	2/0/1	75	E								4
MIN523	Special issues of underground mining operations				1/0/2										
MIN524	Special methods of development of uranium deposits				1/0/2										
MIN525	Special drilling and blasting operations				2/0/1										
MAP575	Applied geodesy				1/0/2										
M-13. Practice module															
AAP408	Production practice I	PD, UC	3								3				
AAP183	Production practice II	PD, UC	3											3	
M-14. Module of final attestation															
ECA109	Writing and defense of the thesis / project	FA	8												8
M-15. Module of additional types of training															
AAP500	Military affairs	ATT	0												
	Total based on UNIVERSITY:							32	28	27	33	29	31	33	27
								60		60		60		60	

Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			
		required component (RC)	university component (UC)	component of choice (CCH)	Total
GED	Cycle of general education disciplines	51		5	56
BD	Cycle of basic disciplines		81	31	176
PD	Cycle of profile disciplines		25	39	
	Total for theoretical training:	*51*	*106*	*75*	*232*
FA	Final attestation	8			8
	TOTAL:	59	106	75	240

Decision of the Academic Council of KazNRTU named after K.Satpayev. Protocol № 12 "22" 04 2024 y.

Decision of the Educational and Methodological Council of KazNRTU named after K.Satpayev. Protocol №6 "19" 04 2024 y.

Decision of the Academic Council of the Mining and Metallurgical Institute. Protocol № 8 "17" 04 2024y.

Vice-Rector for Academic Affairs R.Uskenbayeva

Director of the Institute K.B.Rysbekov

Head of the Department S.K.Moldabaev

Representative of the Council from employers B.A.Bakhramov