NJSC «Kazakh national research technical university named after K.I. Satbayev»
K. Turysov Institute of Geology and Oil-Gas Business
Department of «Geological survey, prospecting and exploration of mineral deposits»

EDUCATIONAL PROGRAM

"GEOLOGY AND EXPLORATION OF MINERAL DEPOSITS"

Bachelor of Engineering and Technology in the educational program "6B07202 Geology and Exploration of Mineral Deposits «Geology and exploration of mineral deposits»

1st edition
in accordance with SCES of higher education of 2018

Almaty 202

The program is drawn up and signed by the parties:

From KazNRTU named after K. Satpayev:

1 .Head of the department GSPaEMD _____ А.А. Бекботаева
2. Director of IGPI named after K.Turysov _____ А.Х. Сыздыков
3. Chairman of the Department UMG, professor _____ А.Б. Байбатша

From employers:

1. Chief Scientific Officer of the Institute of Geological Sciences named after K.I. Satpaev, Candidate of Geological and Mineralogical Sciences Zhunusov AA
2. Director of ICC GEO LLP, active member of PONEN - Kabaziev BM
3. The head of the geological prospecting area of JSC Pustynnoe JSC "Altynalmas", candidate of geological and mineralogical sciences Rassadkin V.V.

From partner university:

Professor of the Department of Geology, Engineering School of Natural Resources, Tomsk Polytechnic University, Doctor of Geological and Mineralogical Sciences Yazikov E.G.

Approved at the meeting of the Academic Council of the Kazakh National Research Technical University named after KI Satpayeva. Protocol №3 from 25.06.2021

Qualification:

Level 6 of the National qualifications framework:
6B07 Engineering, manufacturing and construction industries
6B072 Manufacturing and processing industries (Bachelor):
Geology and exploration of mineral deposits

Professional competency: Work in the geological industry, conducting geological exploration at all stages and phases of geological research, be competent in matters of geology and exploration of the subsoil, the state and prospects of development of the industry, the legal framework for subsoil use, as well as requirements for the quality of mineral raw materials and the conditions of world, regional and local markets.

1 BRIEF DESCRIPTION OF THE PROGRAM

Designed to carry out specialized training of bachelors in the educational program of the specialty "Geology and exploration of mineral deposits" at Satbayev University and was developed as part of the direction "Production and manufacturing industries".

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

- The Law of the Republic of Kazakhstan “On Education” with amendments and additions within the framework of legislative changes to increase the independence and autonomy of universities dated 04.07.18 № 171-VI.
- The Law of the Republic of Kazakhstan “On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on the Expansion of the Academic and Management Independence of Higher Education Institutions” dated 04.07.18 №171-VI.
- Order of the Minister of Education and Science of the Republic of Kazakhstan dated 30.10.18, №595 “On approval of the Model Rules for the activities of educational organizations of the corresponding types”.
- The state compulsory standard of higher education (Appendix 7 to the order of the Minister of Education and Science of the Republic of Kazakhstan dated 31.10.18. №604.
- Decree of the Government of the Republic of Kazakhstan dated 19.01.12, №111 “On approval of the Model Rules for admission to study at educational organizations implementing educational programs of higher education” with amendments and additions from 14.07.16 № 405.
- Decree of the Government of the Republic of Kazakhstan dated 13.08.12, №1042 “On approval of the Concept for the development of the geological industry until 2030”.
- The Law on Subsoil and Subsoil Use and the draft Code on Subsoil and Subsoil Use.
- Code of public reporting on the results of exploration, mineral resources and reserves of KAZRC.
- The concept of the State Geological Exploration Program for 2021-2025, January 31, 2020.
- ‘National Qualifications Framework”, approved by the protocol of March 16, 2016 by the Republican tripartite commission on social partnership and regulation of social and labor relations.
- Sectoral qualifications framework “Geology of solid minerals, common minerals and groundwater” of the National qualification system of the Republic of Kazakhstan. Appendixes №67, 68, 70, 71, 74, 75, 76, 81, 82 to the order of Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated December 26, 2019 №263.
- *The purpose of the educational program of the specialty "Geology and exploration of mineral deposits"* is preparation of highly qualified, competitive and sought-after

specialists in the labor market for geological, surveying, mining enterprises of the Republic of Kazakhstan, capable of performing design, production, technological and organizational work at industrial enterprises in the region. Geology and exploration of mineral deposits includes: areas of science, engineering and technology, covering a set of problems associated with the development of the mineral resource base, based on the study of the Earth and its subsoil with the aim of forecasting, searching, exploration, exploitation of solid, liquid and gaseous minerals , engineering and geological surveys to meet the needs of the fuel, metallurgical, chemical industries, agricultural needs, construction, assessment of the ecological condition of the territories.

Types of labor activity:

- production and technological;
- organizational and management;
- experimental research:
- settlement and design and analysis

A bachelor in the specialty “Geology and exploration of mineral deposits”, depending on the type of professional activity, is prepared to solve the following professional tasks:

a) production and technological activities:

– design of technological processes for the study of natural accumulations of minerals at the stages of regional geological study, prospecting, exploration and development of mineral deposits;

– the solution of production problems in the field of geological, geochemical, environmental and geological work, office, laboratory and analytical studies;

– exploitation of modern field and laboratory equipment and instruments;

– registration of primary geological, geological-geochemical and geological-ecological documentation of field observations, testing of the soil and plant layer, rocks and minerals on the surface, in open, underground mine workings and wells, in surface and underground waters and underground air;

– keeping records of work performed and evaluating their economic efficiency;

– processing, analysis and systematization of field and trade geological, geochemical, ecological and geological information using modern methods of its automated collection, storage and processing;

– development of methodological documents in the field of geological survey, prospecting, exploration, operational work, geological and economic evaluation of mineral resources;

– implementation of measures for the safe conduct of exploration and protection of personnel and the environment at all stages of production;

б) organizational and management:

- organization, planning and management of exploratory, geological survey, exploration, geological support of mining operations;

- carrying out organizational and planned calculations to create geological and production sites;

- development of operational work plans for production units;

- preparation of initial data for the selection and justification of technical and organizational solutions based on economic calculations.

в) experimental research:

- collection and systematization of scientific and technical information of national and world experience in relation to solving geological problems;
- mathematical modeling of geological processes and geological objects based on standard computer-aided design and research packages;
- planning, conducting experiments using specified methods, mathematical processing and analysis of results.

г) design and analysis:

- formation of goals and objectives of the project (program) that provide a modern level of technology for conducting geological works;
- collection and analysis of information source data for design;
- conducting a preliminary feasibility study of project calculations;
- implementation of projects in production and author's supervision.
- implementation of technical design in the field of geological, geochemical and environmental mapping of territories, forecasting, search, exploration, development, geological, economic and environmental assessment of mineral objects, as well as objects associated with underground structures;
- preparation of geological, methodological, and production and technical sections of projects for the activities of production units as part of production teams and independently;
- development of technologies for conducting geological survey, search and exploration works on mineral objects and drawing up a geological task for their implementation.

•*Objects of professional activity of the graduate:*

– mineral natural resources (solid metal, non-metallic, liquid and gaseous), methods of their search and exploration,

– echnologies for studying crystals, minerals, rocks, deposits of solid, liquid and gaseous minerals, geological formations, the earth's crust, the lithosphere and the planet Earth as a whole;

– techniques and technologies for geological, mineralogical, geochemical, hydrogeological, engineering-geological mapping and cartography,

– technologies for forecasting, geological and economic assessment and exploitation of mineral deposits,

– equipment and technologies for the production of works on open and underground mines, quarries, mines, search, exploration and production wells,

– geographic information system – technology studies of subsoil,

– ecological functions of the lithosphere and the ecological state of mining areas of subsurface use.

2 SCOPE AND CONTENT OF THE PROGRAM

The amount of undergraduate is 254 credits regardless of the form of education, applied educational technologies, the implementation of bachelor programs using a network form of realization of the program of bachelor in the individual curriculum, including accelerated learning.

The content of the EP “Geology and exploration of mineral deposits” based on the development of a multi-level system of training, the fundamental nature and quality of training, the continuity and succession of education and science, the unity of training, education, research and innovation, aimed at maximum satisfaction of consumer needs should provide.:

- obtaining a full-fledged and high-quality professional education in the field of Geology of mineral deposits (MPI), confirmed by the level of knowledge and skills, abilities and competencies, their assessment, both in content and in volume
- providing training for bachelors in the geological industry who know the technology, organization and Economics of the geological industry, methods and principles of its improvement and design.
- training of professional and competitive specialists in the field of Geology, prospecting and exploration of mineral deposits;
- ability to apply knowledge of mathematics, fundamental and technical sciences;
- use of methods for analysis and evaluation of experimental results;
- knowledge of modern problems of geology;
- contribute to the acquisition of practical skills in search, exploration and development of minerals, mathematical processing of research results, drawing up technological passports of technological processes using modern information technologies;
- the ability to use the techniques, skills and modern engineering tools necessary in engineering practical activities;
- ability to find and work with the necessary literature, computer information, databases, and other sources of information to solve tasks;
- to form students’ team work skills, production and ethical responsibility, the ability to understand the problem and find solutions from working with different specialists, and the need to improve their knowledge and skills;
- ability to work in a team on an interdisciplinary subject, while showing individuality, and if necessary, solve problems independently;
- readiness of students for professional activities through disciplines that provide fundamental knowledge, skills and abilities to work in production, government organizations and educational institutions;
- be able to conduct analysis and monitoring, as well as make management decisions based on their results;
- have erudition, knowledge of modern social and political issues, speak state, Russian, and foreign languages, tools of market economy, and issues of safety and environmental protection.

Objectives of the educational program:

- study of a cycle of *General education subjects* for providing social and humanitarian education based on the laws of social and economic development of society, history, modern information technologies, state language, foreign and Russian languages;
- study of the *basic disciplines* cycle to provide knowledge of natural science, General technical and economic disciplines as the Foundation of professional education;
- the cycle of *profile disciplines* is focused on the study of key theoretical aspects of Geology, search and exploration of solid, liquid and gaseous minerals, and rational use of natural resources;
- study of disciplines that form knowledge skills and abilities of planning and organization of research, design of geological works;
- familiarization with the technologies and equipment of enterprises during various types of practices.
- acquisition of skills in laboratory research, technological calculations, equipment selection and design using modern computer technologies and programs.

3 REQUIREMENTS FOR APPLICANTS

Admission of persons entering KazNRTU is carried out by placing a state educational order (educational grants), as well as paying for training at the expense of citizens' own funds and other sources.

Admission is carried out according to the applications of an applicant who has completed full secondary, secondary special education on a competitive basis in accordance with the points of the certificate issued by the results of the unified national testing (hereinafter – UNT) or complex testing. To participate in the competition, it is required to gain at least 65 points when entering a national University.

Special requirements for admission to the program if available, including for graduates of 12-year schools, colleges of applied bachelor's programs, etc.

Admission to the university of individuals who have technical and professional or post-secondary education with the qualification of "mid-level specialist" or "applied bachelor" in related areas of training of higher education personnel, providing for shorter training periods, is carried out according to the results of the UNT. (Model rules for admission to education organizations that implement educational programs of higher and postgraduate education dated October 31, 2018 № 600).

Rules for transferring credits for accelerated (reduced) education based on 12-year secondary, technical and higher education

Code	Type of competence	Description of competence	The result of the competence	Responsible
GENERAL (It implies full training with possible additional training depending on the level of knowledge)				
G1	Communicativeness	- Fluent monolingual oral, written and communication skills - ability to communicate not fluently with a second language - Ability to use communicative interaction in different situations - there are basics of academic writing in the native language - diagnostic test for language level	Full 4-year training with a minimum of 240 academic credits (including 120 contact classroom academic credits) with the possible transfer of credits in the second language where the student has an advanced level. The language level is determined by passing a diagnostic test.	Department of Kazakh and Russian languages, Department of English
G2	Mathematical literacy	- Basic mathematical thinking at the communication level – the ability to solve situational problems based on the mathematical apparatus of algebra and the principles of mathematical analysis	Full 4-year training with a minimum of 240 academic credits (including 120 contact classroom academic credits). At positive passing of the diagnostic	Department of mathematics

		- diagnostic test for mathematical literacy in algebra	test the level is Mathematics 1, at negative – the level is Algebra and introduction to mathematical analysis	
G3	Basic literacy in natural science disciplines	- basic understanding of the scientific picture of the world with an understanding of the essence of the basic laws of science - understanding basic hypotheses, laws, and methods, drawing conclusions, and evaluating errors	Full 4-year training with a minimum of 240 academic credits (including 120 contact classroom academic credits). At positive passing of the diagnostic test level is Physics 1, General chemistry, at negative – level of The beginning of physics and Basic foundations of chemistry.	Departments in the areas of natural Sciences.
SPECIFIC (it implies reduced training due to the transfer of credits depending on the level of knowledge on competencies for graduates of 12-year schools, colleges, universities, including humanitarian and economic areas)				
S1	Communicativeness	- Fluent bilingual oral, written and communication skills - ability to communicate not fluently with a third language - writing skills of various styles and genres - skills of deep understanding and interpretation of your own work of a certain level of complexity (essay) - basic aesthetic and theoretical literacy as a condition for full-fledged perception and interpretation of the original text	Full credit transfer by language (Kazakh and Russian)	Department of Kazakh and Russian language
S2	Mathematical literacy	- Special mathematical thinking using induction and deduction, generalization and concretization, analysis and synthesis, classification and systematization, abstraction and analogy. - ability to formulate, justify, and prove statements - application of General mathematical concepts, formulas, and extended spatial perception for mathematical problems	Transfer of credits in the Mathematics discipline (Calculus) I	Department of Mathematics

		- complete understanding of the mathematical analysis basics		
S3	Special literacy in natural science disciplines (Physics, Chemistry)	- Broad scientific perception of the world, which implies a deep understanding of natural phenomena - critical perception for understanding the scientific phenomena of the surrounding world - cognitive abilities to formulate a scientific understanding of the forms of existence of matter, its interaction and manifestations in nature	Transfer of credits in the Physics I, General chemistry	Departments in the areas of natural Sciences
S4	English	- readiness for further self-study in English in various fields of knowledge - readiness to gain experience in project and research work using English	Transfer of English language credits from academic to professional level (up to 15 credits)	Department of English
S5	Computer skills	- Basic programming skills in one modern language - using software and applications for training in various disciplines - availability of a global standard language level certificate	Transfer of credits in discipline Introduction to information and communication technologies, Information and communication technologies	Department of software engineering
S6	Social and humanitarian competencies and behavior	- understanding and awareness of the responsibility of each citizen for the development of the country and the world - Ability to discuss ethical and moral aspects in society, culture, and science	Transfer of credits in Contemporary history of Kazakhstan (except for the state exam)	Department of social Sciences
		- Critical understanding and the ability to dispute for debates on contemporary scientific hypotheses and theories	Transfer of credits in philosophy and other humanitarian disciplines	
PROFESSIONAL (it implies reduced training due to the transfer of credits depending on the level of knowledge on competencies for graduates of colleges, secondary schools, universities, including humanitarian and economic areas)				
P1	Professional competence	- critical perception and deep understanding of professional competencies at level 5 or 6 - Ability to discuss and polemize on professional issues within the framework of the mastered program	Transfer of credits in basic professional disciplines, including general and historical geology, crystallography and mineralogy,	Graduating department

			petrography, structural geology, educational and industrial practice	
P2	General engineering competencies	- basic general engineering skills and knowledge, ability to solve general engineering tasks and problems - be able to use application packages for processing experimental data, solving systems of algebraic and differential equations	Credit transfer for general engineering disciplines (Engineering graphics, descriptive geometry, Drilling of the wells and etc.)	Graduating department
P3	Engineering and computer competence	- basic skills of using computer programs and software systems for solving general engineering tasks	Credit transfer in the following disciplines: computer graphics, fundamentals of CAD, fundamentals of CAE and etc.	Graduating department
P4	Engineering Competencies	- skills and abilities of using technical means and experimental devices for solving general engineering problems	Transfer of credits in academic disciplines of the experimental direction: mineralogy and etc.	Graduating department
P5	Social-economic competencies	- Critical understanding and cognitive ability to reason on contemporary social and economic issues. - A basic understanding of the economic valuation of objects of study and the profitability of industry projects	Recount of credits in social - humanitarian and technical-economic disciplines to offset the elective cycle	Graduating department

The university may refuse to re-credit if the low diagnostic level is confirmed or the final grades for completed disciplines were lower than A and B.

4. REQUIREMENTS FOR COMPLETING STUDIES AND OBTAINING A DIPLOMA

• A graduate of this educational program is awarded the academic degree “Bachelor of Engineering and Technology”.

- Graduated bachelors must have depth knowledge and skills in the field of geology, prospecting and exploration for deposits of solid, liquid and gaseous minerals. They should have practical experience based on the study of basic and specialized disciplines, and the study of the methodology during the passage of all types of practices. They should have the knowledge and skills to analyze the methodology and identify existing problems. Graduates should be able to develop work programs for various types of geological work.
- Bachelors must have communication skills to be able to present their ideas and information, orally and in writing form. The specialist should be able to present graphical information in the form of drawings, tables, slides and drawings. He must be competent in the search and interpretation of technical information using various search system (patent search, literature review of magazines and books, the Internet).
- Bachelors should be socially mobile, be able to adapt to new situations in a professional environment.
- Bachelors should be able to organize cooperation in a team, show creativity and breadth of interests in order to solve interdisciplinary problems. A specialist must be tolerant, capable of criticism and self-criticism, and be prepared to accept the role of team leader and have the skills of interaction and cooperation. A graduate must have an ethical education and the need for his development through self-improvement and learning throughout life.
- Bachelors should have a good knowledge of Kazakh, Russian and foreign languages, be able to work in the international community, maintain ethical rules in society, at work and in interpersonal communication. They must demonstrate skills in achieving goals, solving problems in unusual situations. Specialists should take care of environmental protection and, while improving their qualifications, serve the development of the welfare of the whole society.
- Bachelors should have: good communication skills, appreciate the traditions of other cultures, their diversity in modern society, fundamental basic education, economic, social and legal training.

5 CURRICULUM WORK PLAN

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY after K. SATBAYEV

SATBAYEV UNIVERSITY

APPROVED
Chairman of the Board-
Rector of the KazNRTU after K.Satbayev
M.M. Begentayev
«__» ____ 2021

WORKING CURRICULUM
of the educational program for 2021-2022 academic year admission
Educational program 6B07202 - "Geology and exploration of mineral deposits"
Group of Educational programs B071 - "Mining and extraction of minerals"

Full-time study Study duration : 4 years Academic degree: bachelor of engineering and technology

Year of study	Code	Name of discipline	Cycle	Total Credits	Total hours	lec/lab/pr/	SIW (including SIWT) in hours	Code	pre-requisites
1		**1 semester (autumn 2021)**							
	LNG108	English	G	5	150	0/0/3	105		no
	LNG104	Kazakh (Russian) language	G	5	150	0/0/3	105		no
	HUM129	Culturology	G	2	60	1/0/0	45		no
	MAT101	Mathematics I	B	5	150	1/0/2	105		no
	PHY111	Physics I	B	5	150	1/1/1	105		no
	GEN177	Engineering and Computer Graphics	B	5	150	1/0/2	105		no
	GEO431	General and historical geology	B	5	150	2/1/0	105		no
	KFK101	Physical education I	G	2	60	0/0/2	30		
		Total:		**34**					
2		**3 semester (autumn 2022)**							
	HUM132	Philosophy	G	5	150	1/0/2	105		no
	CHE451	Life safety	G	2	60	1/0/0	45		no
	HUM122	Psychology	G	2	60	1/0/0	45		no
	MNG487	Fundamentals of Entrepreneurship, Leadership and Anti-corruption culture	G	3	90	1/0/1	60		no
	MAT103	Mathematics III	B	5	150	1/0/2	105		MAT102
	GEO433	Crystallography and mineralogy	B	5	150	1/2/0	105		GEO431
	CHE495	Chemistry	B	5	150	2/1/0	105		no
	KFK103	Physical education III	G	2	60	0/0/2	30		
		Total:		**29**					
3		**5 semester (autumn 2023)**							
	GEO439	Sedimentology	B	5	150	2/1/0	105		GEO177
	GEO411	Geophysical methods of prospecting and exploration	B	5	150	2/1/0	105		GEO177
	PET406	Drilling of the wells	B	5	150	2/1/0	105		no
	GEO438	Geology of mineral deposits	S	5	150	2/1/0	105		GEO177
	3218	**Electives**	B	5					
	3219	**Electives**	B	5					
		Total:		**30**					
4		**7 semester (autumn 2024)**							
	4220	**Electives**	B	5					
	4306	**Electives**	S	5					
	4307	**Electives**	S	5					
	4308	**Electives**	S	5					
	4309	**Electives**	S	5					
	4310	**Electives**	S	5					
		Total:		**30**					

Code	Name of discipline	Cycle	Credits	Total hours	lec/lab/pr/ISW	SIW (including SIWT) in hours	Code	pre-requisites
	2 semester (spring 2022)							
LNG108	English	G	5	150	0/0/3	105		LNG108
LNG104	Kazakh (Russian) language	G	5	150	0/0/3	105		LNG104
HUM100	Contemporary History of Kazakhstan	G	5	150	1/0/2	105		no
HUM128	Political science	G	2	60	1/0/0	45		no
MAT102	Mathematics II	B	5	150	1/0/2	105		MAT101
PHY112	Physics II	B	5	150	1/1/1	105		PHY111
GEO432	Structural geology	B	5	150	2/1/0	105		GEO431
KFK102	Physical education II	G	2	60	0/0/2	30		
	Total:		**34**					
	4 semester (spring 2023)							
CSE677	Information and communication technology	G	5	150	2/1/0	105		no
HUM127	Sociology	G	2	60	1/0/0	45		no
CHE452	Ecology and sustainable development	G	2	60	1/0/0	45		no
GEO434	Petrography	B	5	150	1/2/0	105		GEO433
GEO435	Geology and Mineral Resources of Kazakhstan	B	5	150	2/1/0	105		GEO431
GEO436	Geoinformation technologies in geology	B	5	150	2/1/0	105		no
MAP113	Geodesy with the basics of topography	B	5	150	2/1/0	105		no
KFK104	Physical education IV	G	2	60	0/0/2	30		
	Total:		**31**					
	6 semester (spring 2024)							
GEO429	Fundamentals of prospecting and exploration of mineral deposits	B	5	150	2/1/0	105		GEO432
GEO428	Mathematic methods in geology	B	5	150	2/0/1	105		no
GEO443	Fundamentals of subsoil	S	5	150	2/0/1	105		GEO431
GEO430	Hydrogeology with the basics of engineering geology	S	4	120	2/1/0	90		GEO431
GEO445	Oil and Gas Geology	S	5	150	2/0/1	105		GEO431
3305	**Electives**	S	5					
	Total:		**29**					
	8 semester (spring 2025)							
ECA003	Preparation & writing of thesis (project)*	FA	6					
ECA103	Thesis (project) defence*	FA	6					
4311	**Electives**	S	5					
	Total:		**17**					

Other academic education

Year of study	Code	Name of discipline	Credits		Semester
		Obligatory education with P/NP assessment (Professional practice)			
1	AAP164	Educational geological survey practice (B)	2		2
2	AAP143	Industrial internship I (S)	2		4
3	AAP163	Industrial internship II (S)	4		6
		Other education			
1		Sports club sectional	0		5-7
2-3	AAP500	Military training	0		3-6

Total number of credits

Cycle of disciplines	Credits: compulsary	elective		total
Cycle of general disciplines (G)	58			58
Cycle of basic disciplines (B)	97	15		112
Cycle of special disciplines (S)	25	35		60
Total of theoretical study :	180	50		230
Final attestation (FA)	12			12
OVERALL:	192	50		242

Decision of the Academic Council of KazNRTU after K.Satbayev. Minutes # 3, dated "25" 06 2021.

Decision of the Educational and Methodological Board of KazNRTU after K.Satbayev. Minutes # 6 dated "14" 06 2021.

Decision of the Academic Council of the Institute of Geology, petroleum and mining engineering. Minutes # 5, dated "24" December 2020.

Vice-rector for academic affairs — B. Zhautikov

Director of Geology, petroleum and mining engineering institute — A. Syzdykov

Head of the department "Geological mapping, prospecting and exploration of mineral deposits" — A. Bekbotayeva

Representative of Specialty council — A. Zhunusov

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY after K. SATBAYEV

SATBAYEV UNIVERSITY

APPROVED
Director of the Institute of Geology, petroleum and mining engineering
_____ A. Syzdykov
«__» _____ 2021.

MAJOR ELECTIVE DISCIPLINES educational program for the 2021-2022 academic year admission
Educational program 6B07202 - "Geology and exploration of mineral deposits"
Group of Educational programs B071 - "Mining and extraction of minerals"

Full-time study Study duration : 4 years Academic degree: bachelor of engineering and technology

Year of study	Code of elective	Code of discipline	Name of discipline	Cycle	Credits	Total hours	lec/lab/pr	SIW (including SIWT) in hours	Prerequisites
			5 semester (autumn 2023)						
3	3218	**GEO 440**	**Geological mapping**	B	5	150	**2/0/1**	105	**GEO 432**
		GEO 437	Oil and gas areas in Kazakhstan				2/0/1		GEO 431
		PET405	Revervoir engineering I: Primary recovery				1/0/2		no
	3219	**GEO 441**	**Crystaloptics**	B	5	150	**1/2/0**	105	**GEO 434**
		GEO 442	Lithology, diagenesis and biofacies of oil and gas complexes.				2/0/1		GEO 434
			Total:		**10**				
			6 semester (spring 2024)						
	3305	**GEO 444**	**Geological and industrial types of mineral deposits**	S	5	150	**2/0/1**	105	**GEO 438**
		GEO 446	Geodynamics of lithospheric plates				2/1/0		GEO 438
			Total:		**5**				
4			**7 semester (autumn 2024)**						
	4220	**GPH 181**	**Theoretical bases and applied aspects of well logging**	B	5	150	**2/1/0**	105	**GEO 431**
		GPH 180	Geophysical exploration (well logging) of uranium deposits				2/1/0		GEO 431
		GPH 182	Modern geophysical technologies for calculating reserves of uranium deposits				2/1/0		GEO 431
		MIN 502	Mining				2/1/0		no
			Total:		**5**				
	4306	**GEO 451**	**Computer technologies in geology**	S	5	150	**1/2/0**	105	**GEO 431**
		GEO 447	Oil and gas provinces of the world				2/0/1		GEO 445
	4307	**GEO 457**	**Applied geochemical studies**	S	5	150	**2/0/1**	105	**GEO 476**
		GEO 453	Geochemical methods of exploration of mineral deposits				2/0/1		GEO 476
		GEO 456	Theoretical basis for searching and exploration of oil and gas fields				2/0/1		GEO 445
	4308	**GEO 452**	**Laboratory Methods of studying minerals**	S	5	150	**1/2/0**	105	**GEO 434**
		GEO 481	Geodynamics of oil and gas pools				2/0/1		**GEO 431**
		GEO 448	Physics of oil reservoir				2/0/1		GEO 447
	4309	**GEO 455**	**Fundamentals of geotectonics**	S	5	150	**2/0/1**	105	**GEO 432**
		GEO 450	Geological bases of oil and gas fields' development and exploitation				2/0/1		GEO 445
	4310	**GEO 184**	**Geological assessment of mineral resources and reserves**	S	5	150	**2/0/1**	105	**GEO 476**
		GEO 454	Geological and economic evaluation of mineral deposits				2/0/1		GEO 476
		GEO 449	Oil and gas geology and estimation of reserves				2/0/1		GEO 445
			Total:		**25**				
			8 semester (spring 2025)						
	4311	**GEO 458**	**Mine geology**	S	5	150	**2/0/1**	105	**GEO 476**
		GEO 459	Geochemistry of organic matter and hydrocarbons of oil and gas basins				2/0/1		GEO 445
		GEO 461	**Geomorphology and anthropogenic geology**				**2/0/1**		**GEO 431**
		GEO 460	Computer modeling of oil and gas fields				2/0/1		GEO 445
			Total:		**5**				

Credits numbers of elective disciplines over the entire period of study	
Cycle of disciplines	**Credits**
Cycle of basic disciplines (B)	15
Cycle of special disciplines (S)	35
Overall:	50

Head of the department "Geological mapping, prospecting and exploration of mineral deposits" A. Bekbotayeva

Representative of Specialty council A. Zhunusov

6 GRADUATE COMPETENCY FRAMEWORK

6.1. At the university, based on achieving the learning outcomes for each discipline, the main learning descriptors based on Dublin descriptors have been adopted:

a. Knowledge and understanding - by demonstrating knowledge and understanding in the field of study formed on the basis of secondary education, including certain advanced knowledge in the field of study;

b. Application of knowledge and understanding - by applying their knowledge and understanding of actions that indicate a professional approach to the profession through a set of competencies demonstrated through the formation and justification of arguments and solutions to problems in the field of study;

c. Expression of judgments and analysis of actions - by accumulating, evaluating, processing and interpreting data, knowledge and skills in order to develop independent judgments taking into account the analysis of social, ethical and scientific considerations;

d. Communicative abilities and IT skills - by transferring real and virtual information, problems, their solutions, ideas, their implementation to both specialists and non-specialists in the field of study;

e. Self-learning and existential skills - by developing skills of self-study and retraining with a high degree of autonomy in the field of study and related fields.

6.2. At the university, based on the achievement of learning outcomes in each discipline, the main framework competencies are adopted:

a. Natural-scientific and theoretical-worldview competencies;

b. Social and personal competencies;

c. General engineering professional competencies;

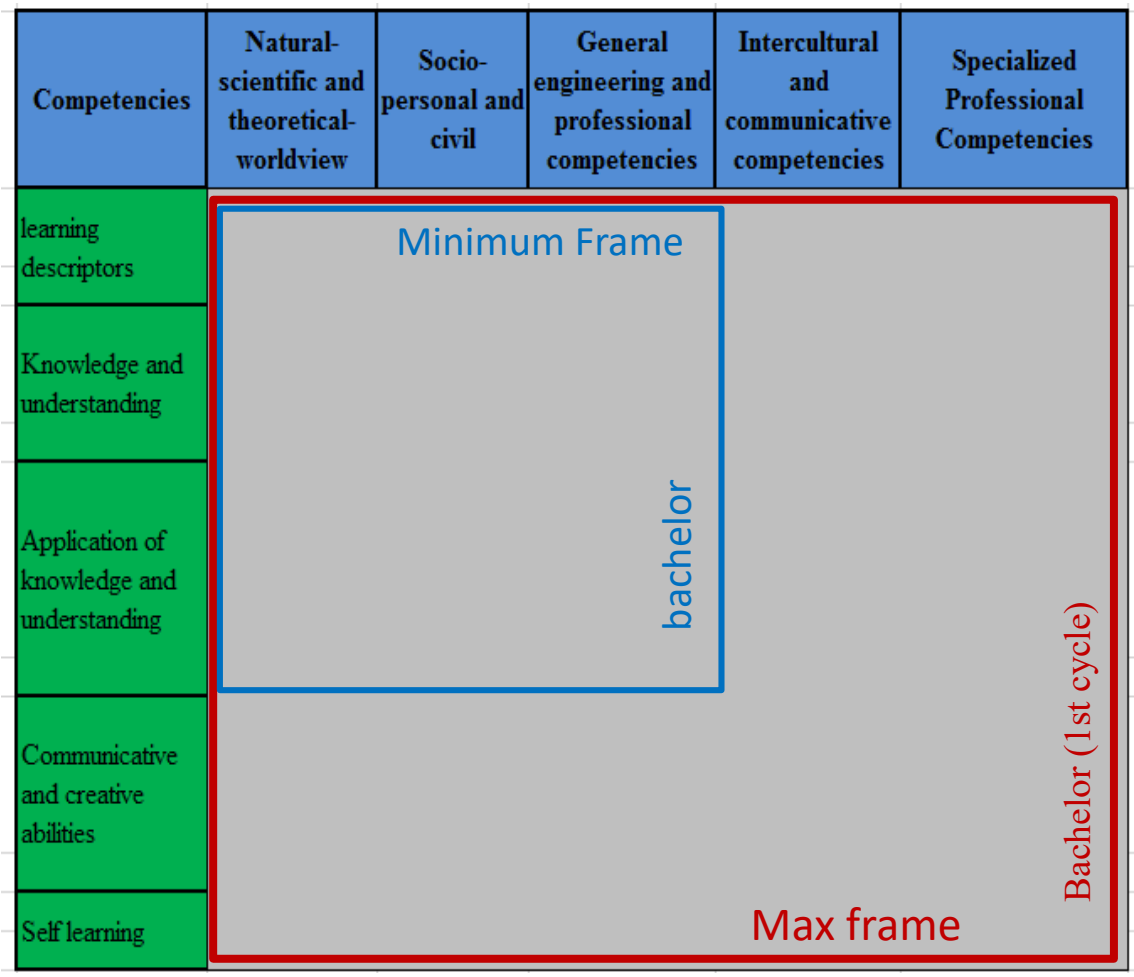
d. Communicative and IT virtual competencies;

e. Special professional competences, including additional ones (Minor).

6.3. At the university, on the basis of training descriptors and basic framework competencies, the following framework characterization of graduate competencies is adopted, which guarantees the achievement of a competitive level in the professional market.

6.4. Based on the specified competency framework of a university graduate, EP moderators form the results of training, competencies, sub competencies and the EP competency matrix.

6.5. Based on the specified competency framework of a university graduate, departments and teachers form the learning outcomes, competencies, sub competencies and competency matrix of a readable discipline.


Competencies
Natural-scientific and theoretical-worldview
Socio-personal and civil
General engineering and professional competencies
Intercultural and communicative competencies
Specialized Professional Competencies
learning descriptors
Knowledge and understanding
Application of knowledge and understanding
Communicative and creative abilities
Self learning
Minimum Frame
bachelor
Bachelor (1st cycle)
Max frame

7 COMPETENCY BUILDING PROCESS

7.1. Discipline (Course unit) - an independent, formally structured teacher format for teaching with a clear set of learning outcomes, training activities in the context of time and sequence with assessment criteria allow the student to successfully complete the discipline to accumulate the depth of competencies expressed in the amount of credits earned.

7.2. Learning outcome - a provision that a student should know, understand and be able to do at the end of the discipline, assessed by clear and transparent assessment criteria. The results of training in each discipline should be aimed at achieving one or more competencies of the graduate, noted in section 6.2.

7.3. Assessment criteria - clear descriptions for the student to understand what the student should do at each level of assessment to maximize learning outcomes. Evaluation methods and criteria for elements of the discipline must meet and be consistent with the learning outcomes of the training activities described during the development of the discipline.

7.4. Competency - the ability of a student (graduate) to use knowledge, skills and personal, social, methodological abilities in professional situations, as well as in personal development. The main competencies of the graduate are described in section 6.2 and the achievement of one or more of them is the goal of any university discipline.

7.5. Descriptors - the learning outcomes required for a student to achieve graduate competencies reflect the depth of such achievement by the student. The university has accepted descriptors, as reflected in Section 6.1, and are similar to the Dublin descriptors of European higher education.

7.6. Credits - Express the volume of mastering the discipline in whole numbers at a university or other educational infrastructure, from the normatively approved by the university, by transferring loans. Credits allow the student to accumulate the amount of loans to achieve certain qualifications specified in chapter 8.

7.7. Unit competency matrix - The results of the discipline should lead to the achievement of competencies (competencies) in the competency matrix of the graduate of section 6.3.

7.8. Module (Cycle) - a certain set of disciplines expressing a single set of competencies completes the development of a certain level of qualification of a student (graduate).

7.9. Module competency matrix (Cycle competency matrix) - The results of module training should lead to the achievement of competencies above the minimum level of development of the module.

7.10. Applied Undergraduate General Engineering (Associate Degree, Short Cycle) - qualification assigned by the university if the student exceeds the minimum competence of the graduate in the amount of at least 124 credits of theoretical education with a diploma according to section 8.

7.11 Bachelor of the second specialty (Minor) - Qualification awarded by a university if a student exceeds the minimum framework of professional competencies of

a graduate for credits of theoretical study in another educational program with a diploma according to section 8.

7.12. Undergraduate (Academic Degree, 1st Cycle) - a qualification assigned by a university when a student reaches the maximum competence of a graduate in the amount of at least 240 credits of theoretical education with a diploma according to section 8.

8 COMPETENCIES ACQUIRED BY STUDENTS IN THE DEVELOPMENT OF THE EDUCATIONAL PROGRAM "GEOLOGY AND EXPLORATION OF MINERAL DEPOSITS"

General cultural competencies (GCC)	
GCC 1	Ability to communicate verbally and in writing form in the state, Russian and foreign languages for solving problems of interpersonal and intercultural interaction
GCC 2	Understanding and practical use of the norms of a healthy lifestyle, including prevention, the ability to use physical culture to optimize working capacity
GCC 3	The ability to analyze the main stages and patterns of the historical development of society for the formation of a civic position
GCC 4	The ability to use the basics of philosophical knowledge to form a worldview position
GCC 5	The ability to critically use the methods of modern science in practice
GCC 6	Awareness of the need and the acquisition of the ability to learn independently and improve their skills throughout their working lives
GCC 7	Knowledge and understanding of professional ethical standards, proficiency in professional communication techniques
GCC 8	The ability to work in a team, tolerantly perceiving social, ethnic, religious and cultural differences
GCC 9	The ability to use the basics of economic knowledge in various fields
General professional competences (GPC)	
GPC -1	Ability to acquire new knowledge with a high degree of independence using modern educational and information technologies, possession of computer skills with basic programming sufficient for professional activities
GPC -2	Knowledge of the basic methods, methods and means of obtaining, storing, processing information, the ability to use modern technical means and information technologies to solve communicative problems using traditional storage media, distributed knowledge bases, and information in global computer networks
GPC -3	Knowledge and understanding of the structure of crystals, the ability to determine minerals, rocks, the genesis and order of crystallization of minerals in rocks, analysis and restoration of thermodynamic conditions for the formation of rocks, mineralogenic, hydrocarbon, hydrogeological, geoecological and engineering-geological systems
GPC -4	Understanding and analyzing geological maps of various contents (tectonic, geomorphological, minerals, hydrogeological, oil and gas, geoecological, geotechnical, etc.), understanding the patterns of spatial distribution of regional and local structural elements of the earth's crust.
Professional Competencies (PC)	
P	Professional competences, including according to the requirements of industry professional standards, providing deep theoretical knowledge and practical skills in the field of geology and exploration of mineral deposits
PC 1	Knowledge and use of technologies for geological surveying, prospecting, exploration, assessment, operational, production, hydrogeological, engineering and survey, geoecological, mineralogical, petrological work and the requirements for the quality of geological materials, rules for maintaining and processing geological documentation.

PC 2	Knowledge, the ability to choose and justify the methods of prospecting and exploration of mineral deposits (geochemical, lithological, geophysical, mineralogical, petrographic, lithological, etc.), the ability to determine and identify criteria and search features, based on the analysis, the ability to highlight promising regions and structures for various types of minerals (oil, gas, groundwater, solid minerals, including radioactive and rare earth elements)
PC 3	Knowledge of the types, technical characteristics, rules of operation, maintenance and metrological support of equipment, instruments, apparatus used in conducting geological, hydrogeological, engineering and geological research, skills in working with microscopes (polarizing, electronic), instruments for the geochemical study of the composition of minerals, rocks , ores (express analysis of the composition of rocks and minerals - spectrometers, X-ray structural analyzers, etc.)
PC 4	Knowledge, ability to choose and justify research methods for minerals, rocks, minerals, paleontological residues, hydrocarbon substances, groundwater, abilities and skills to apply different types of research methods, the ability to compare, analyze the results and make conclusions, to prepare reports on research methods
PC 5	Knowledge of the genesis, conditions of occurrence of minerals, understanding of the relationship, analysis of the conditions for the formation of oil, gas, groundwater, solid minerals, the era of ore formation; migration, concentration and conservation of ore components, hydrocarbons, groundwater in structural tectonic, stratigraphic, lithological and sedimentation traps
PC 6	Knowledge, understanding of the principles of testing methods for various types of solid minerals, calculation of reserves of studied types of minerals. The ability to solve the problems of geological work using innovative technologies (modeling of geological objects and calculation of reserves in the programs Micromine, Leapfrog, Petromod, Petrel, etc.).
PC 7	The ability to use knowledge of the legislation on subsoil and subsoil use of the Republic of Kazakhstan, international standards of geological documentation, other regulatory documents in professional activities. Knowledge of the state and prospects of the development of the mineral resource base of the region, the ability to use knowledge of the economy of mineral raw materials and exploration work to draw up feasibility studies, work programs
PC 8	Geoinformation systems, graphic systems, specialized office application packages (ArcGis, MapInfo, and others) used in geology, hydrogeology, oil and gas geology, engineering geology, geoecology. The ability to use advanced domestic and foreign experience in processing data from geological works: statistical data, data from regional geochemical, geological, hydrogeological studies to compile maps of the distribution of minerals in space and to identify patterns of their distribution in the earth's crust.

Matrix of competencies of the educational program "Geology and exploration of mineral deposits"

Discipline index	Name of discipline	General cultural									General professional				Professional							
		GC-1	GC-2	GC-3	GC-4	GC-5	GC-6	GC-7	GC-8	GC-9	GPC-1	GPC-2	GPC-3	GPC-4	PC-1	PC-2	PC-3	PC-4	PC-5	PC-6	PC-7	PC-8
Compulsory component																						
LNG 108	English language	x		x		x	x	x	x													
LNG 104	Kazakh (Russian) language	x		x		x	x	x	x													
HUM129	Culturology		x		x		x		x													
KFK101-104	Physical culture 1-4																					
HUM132	Philosophy			x	x	x		x	x													
HUM128	Political science			x	x			x														
HUM122	Psychology				x			x														
HUM100	Contemporary history of Kazakhstan			x	x				x													
MNG487	Fundamentals of entrepreneurship, leadership and anti-corruption culture					x		x	x	x												
HUM127	Sociology			x	x	x		x														
CHE451	Safety of life		x	x													x			**x**		
CHE452	Ecology and sustainable development			x	x	x		x														
MAT101	Mathematics I										x	x										
MAT102	Mathematics II										x	x										
MAT103	Mathematics III										x	x										
PHY111	Physics I												x		x							
PHY112	Physics II												x		x							
GEN177	Engineering and computer graphics										x	x		x								
CSE 174	Information and communication technology (eng)										x	x										**x**
GEO436	Geoinformation technologies in geology										x	x		x						x		x
GE0431	General and historical geology												x			x	x	x				
GEO432	Structural geology														x	x	x	x				
GE0433	Crystallography and mineralogy												x				x	x				

Discipline index	Name of discipline	General cultural									General professional				Professional							
		GC-1	GC-2	GC-3	GC-4	GC-5	GC-6	GC-7	GC-8	GC-9	GPC-1	GPC-2	GPC-3	GPC-4	PC-1	PC-2	PC-3	PC-4	PC-5	PC-6	PC-7	PC-8
CHE495	General chemistry												x				x	x				
GE0434	Petrography												x			x	x	x				
GE0435	Geology and mineral resources of Kazakhstan											x	x	x		x			x		x	
MAP113	Geodesy with the basics of topography														**x**	x	**x**					**x**
GE0439	Sedimentology												x			x	x	x				
GE0411	Geophysical methods of search and exploration												x	x	x		x	x			x	
PET406	Well Drilling													x		x	x	x				
GE0438	Geology of mineral deposits												x	x		x			x			
GE0429	Basic search and exploration of mineral deposits											x	x	x	x	x	x			x	x	
GE0428	Mathematical methods in geology										x	x				x						**x**
GE0443	Fundamentals of underutilization											x		x	x	x					x	
GE0430	Hydrogeology with the basics of engineering geology														x	x	x	**x**				
GE0445	Petroleum geology												x	x	x	x	x	x	x		x	
Elective courses																						
GEO440	Geological mapping										x	x		x	x	x	x					
GEO437	Oil and gas fields of Kazakhstan											x		x					x			
PET405	Development of oil and gas fields I: Primary mining														x	x		x	x			x
GEO441	Crystal optics												x			x	x	x				
GEO442	Lithology, diagenesis and biofaction of oil and gas basins												x	x		x	x	x	x			
GE0444	Geological-industrial types of mineral deposits											x		x		x		x	x			
GEO446	Geodynamics of lithosphere plates												x	x		x						
GPH181	Theoretical bases and applied aspects of GIS														**x**	x						**x**
GPH180	Geophysical surveys of uranium deposits														**x**	x	**x**	**x**				**x**
GPH182	Modern geophysical technologies when calculating the reserves of fields										x	x			**x**	x	**x**	**x**				**x**
MIN502	Mining															x		x	x			

Discipline index	Name of discipline	General cultural									General professional				Professional							
		GC-1	GC-2	GC-3	GC-4	GC-5	GC-6	GC-7	GC-8	GC-9	GPC-1	GPC-2	GPC-3	GPC-4	PC-1	PC-2	PC-3	PC-4	PC-5	PC-6	PC-7	PC-8
GEO451	Computer technology in geology										x	x			x		x				x	x
GEO447	Oil and gas provinces of the world													x		x			x			
GEO457	Applied geochemical surveys										x	x	x		x	x	x	x		x	x	
GEO453	Geochemical methods of searching the place of birth of useful fossils										x	x			**x**	x	**x**	**x**				**x**
GEO456	Theoretical bases of exploration and exploration of oil and gas fields												x	x	x	x			x		x	
GEO452	Laboratory methods of studying useful fossils												x		x	x	x	x				
GE0481	Geodynamics of oil and gas basins										**x**		x	**x**								
GEO448	Physics of the oil layer											x			x				x			
GEO455	Fundamentals of geotectonics													x					x			
GEO450	Geological bases of development and operation of oil and gas fields									x			x	x	x	x				x		
GEO184	Geological assessment of mineral resources and reserves									x	x	x	x	x	x	x				x	x	
GEO454	Geological and economic assessment of mineral deposits									x	x	x										
GEO449	Petroleum geology and reserves calculation									x	x	x	x	x	x	x				x	x	x
GEO458	Ore geology												x	x	x	x	x			x	x	x
GEO459	Geochemistry of organic matter and hydrocarbons in oil and gas basins												x	x	x	x		x	x			
GEO461	Geomorphology and anthropogenic geology												x	x		x	x		x			x
GEO460	Computer modeling of oil and gas fields										x	x		x	x		x					x
State final attestation																						
ECA101	Preparation and writing of diploma work (project)	**x**	x	x	x	x	x	x	x	x	x	x	x	x	**x**	**x**	**x**	**x**	x	x	x	x
Additional academic programes																						

Discipline index	Name of discipline	General cultural									General professional				Professional							
		GC-1	GC-2	GC-3	GC-4	GC-5	GC-6	GC-7	GC-8	GC-9	GPC-1	GPC-2	GPC-3	GPC-4	PC-1	PC-2	PC-3	PC-4	PC-5	PC-6	PC-7	PC-8
AAP164	Educational geological-surveying practice	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
AAP143	Production practice I	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
AAP163	Production practice II	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

9 MINOR CONTINUING EDUCATION POLICY

When developing at least 30 credits in the disciplines of the Mining Engineering program, including the following compulsory disciplines:

M1 –Mining Basics - 5 credits
M2 – Construction of a mining enterprise - 5 credits
M3 –Mining technology - 5 credits
M4 - Rock Destruction by Explosion - 5 credits
M5 - Open pit mining technology
M6 - Tunnel construction technology

Minor specialty “Mining Engineering” is assigned with the issuance of the diploma supplement in the established form.

When developing at least 30 credits in the disciplines of the program "Geotechnology for the development of uranium deposits", including the following compulsory disciplines:

M1 - Technology of underground downhole leaching of ores - 5 credits
M2 - Mineralogy of Uranium Ores – 5 credits
M3 - Computer applications in uranium production (Atomgeo, ArcGIS, Surpac) - 5 credits
M4 - Geochemistry of radioactive elements - 5 credits
M5 - Geology and Genesis of Uranium Deposits - 5 credits
M6 - Uranium Technology Basics - 5 credits
M7 - Datamine / Micromine - 5 credits
M8 - Feasibility study for uranium deposits development projects - 5 credits
M9 - Basin Analysis and Sedimentary Geology - 5 credits

An additional Minor specialty “Geotechnology for the development of uranium deposits” is assigned with the issuance of an appendix to the diploma of the established sample.

10 ECTS DIPLOMA SUPPLEMENT

The application is developed according to the standards of the European Commission, Council of Europe and UNESCO / CEPES. This document is for academic recognition only and is not an official confirmation of an educational certificate. Without a diploma of higher education is not valid. The purpose of filling out the European Annex is to provide sufficient information about the holder of the diploma, the qualifications obtained by him, the level of this qualification, the content of the training program, the results, the functional purpose of the qualification, as well as information about the national education system. The application model, which will be used to transfer estimates, uses the European system of transfers or credit transfer (ECTS).

The European Diploma Supplement provides an opportunity to continue education at foreign universities, as well as confirm national higher education for foreign employers. When traveling abroad for professional recognition will require additional legalization of a diploma of education. The European Diploma Supplement is completed in English upon individual request and is issued free of charge.

Bachelor of Engineering and Technology:

Level 4 - Geologist-technician-surveyor, geologist-technician-search engine, geologist-technician-prospector, geologist-technician-cartographer, geochemist-technician, technician-geoecologist, technician-hydrogeologist, technician of engineering geology

Level 5 - Geologist-specialist-surveyor, geologist-specialist-search engine, geologist-specialist-prospector, geologist-specialist-cartographer, geochemist-specialist, geoecologist-specialist, hydrogeologist-specialist, mineralogist-specialist, petrographic specialist, specialist in engineering geology, lithologist-specialist sedimentologist, paleontologist specialist

Level 6 - Geologist-engineer-surveyor, geologist-engineer-search engine, geologist-engineer-prospector, geologist-engineer-cartographer, geochemist-engineer, geoecologist-engineer, geologist-engineer-hydrogeologist, mineralogist-engineer, petrographic engineer , engineer of engineering geology, lithologist, sedimentologist engineer, paleontologist engineer, senior surveyor geologist, senior search geologist, senior geologist-cartographer, senior geochemist, senior geoecologist, senior hydrogeologist, senior mineralogist, senior petrograph, Senior Engineering Geologist, Senior Litho log sedimentologist, senior paleontologist

Level 7 - Chief surveyor geologist, chief search geologist, chief survey geologist, chief cartographer, chief geochemist, chief geoecologist, chief geologist, chief hydrogeologist, chief mineralogist, chief petrograph, chief engineering geologist, chief sedimentologist, lithologist, chief paleontologist

Level 8 - President of the enterprise, general manager.

Typical Diploma Supplement Form
of the European system of transfer and accumulation of points

Kazakh National Research Technical University named after K.I. Satpayev
Қ.И.Сәтбаев атындағы Қазақ Ұлттық техникалық университеті

DIPLOMA SUPPLEMENT
_____

This Diploma Supplement follows the model developed by the European Commission, the Council of Europe and UNESCO/CEPES. The purpose of this supplement is to provide sufficient independent data to improve the international 'transparency' and fair academic and professional recognition of qualifications (diplomas, degrees, certificates, etc.) It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free of any value - judgments, equivalence statements or suggestions about recognition. Information should be provided in all eight sections. Where information is not provided, a reason should be given.

1	INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION	
1.1	Family Name	
1.2	Given Name	
1.3	Date of Birth (Day/Month/Year)	Republic Region, city (place of birth)
1.4	Student Identification Number	
2.	INFORMATION IDENTIFYING QUALIFICATION	
2.1	Title of Qualification and the Title Conferred	Bachelor in Technics
2.2	Major	
2.3	Minor	
2.4	Name and Status of Awarding University in original language	Қ.И.Сәтбаев атындағы Қазақ Ұлттық техникалық зерттеу университеті
2.5	Name and Status of Awarding University in English	Kazakh National Research Technical University named after K.I. Satpayev
2.6	Language of Instruction	
3	INFORMATION ON THE LEVEL OF THE QUALIFICATION	
3.1	Level of Qualification	Bachelor's level/ first-cycle degree of higher education
3.2	Official Length of Program	4 or 3 years

English
CODE - LNG108
CREDIT - 10 (0/0/6/4)
Prerequisite - Diagnostic Test / LNG1051-1056

LNG108
AIM AND OBJECTIVES OF THE COURSE
The discipline in English “Beginner English” is intended primarily for learning from scratch. This course is also suitable for those who have only general basic knowledge of the language. After passing this level, the student will be able to confidently communicate on basic topics in English, learn the basics of grammar and lay a certain foundation that will improve his skills at the next stage of learning English.
Post requisites of the course: Elementary English.

The discipline "Elementary English" is the foundation for learning English, which is aimed at developing the receptive skills of students (reading and listening) and productive skills (writing and speaking), the analysis of basic knowledge, the use and memorization of basic grammar rules and the development of pronunciation and elementary vocabulary as well as encouraging self-study and critical thinking.
Prerequisites for the course: Beginner.
Post requisites of the course: General 1.

The goal of the “General English 1” course is to provide students with the opportunity to gain sufficient knowledge to become more free in everyday social and academic conditions. Students are working on improving pronunciation, expanding vocabulary and grammar. At this level, the main task will be to consolidate the skills acquired earlier, to learn how to compose and correctly apply complex syntactic constructions in the English language, and also to achieve a really good pronunciation.
Prerequisites for the course: Elementary English.
Post requisites of the course: General 2.

The General English 2 course is for students who continue to study General English 1. The course is focused on the ability to actively use in practice most aspects of the English language, conditional sentences, passive phrases, etc. At this stage, the student will be able to maintain a conversation with several interlocutors or express their point of view. The student significantly expands his vocabulary, which will allow him to freely express his thoughts in any environment. At the same time, the speech will be replenished with various synonyms and antonyms of already familiar words, phrasal verbs and stable expressions.
Prerequisites for the course: General 1.
Post requisites: Academic English.

The main goal of the Academic English course is to develop academic language skills. Discipline is a language style that is used in writing academic works (paragraph, abstract, essay, exposition, etc.). This course is designed to help students become more successful and effective in their learning, developing critical thinking skills and independent learning.
Prerequisites: General 2.
Post requisites of the course: Professional English.

"Business English" is English for business communication, business and career. Knowledge of business English is useful for negotiating and business correspondence, preparing presentations and informal communication with business partners.
Features of preparation are that it is necessary not only to master vocabulary, but also to master new skills: presentation, communicative, language, professional.
Prerequisites course : IELTS score 5.0 , and / or Academic English
Post requisites of the course : Professional English, IELTS score 5.5-6.0

The "Professional English" course is designed for B2 + students, whose goal is to increase the language competence of students in relevant professional fields. The main goal of the course is to teach students how to work with texts, both audio and written, in their specialty. The curriculum is built on the necessary vocabulary (words and terms), often used in English for special purposes. Students will acquire professional English language skills through integrated learning based on content and language, master the vocabulary in order to read and understand original sources with a high degree of independence, and practice various communication models and vocabulary in specific professional situations.
Prerequisites for the course: Business English.
Post-requisites of the course: any elective course.

Kazakh / Russian language
CODE - LNG104
CREDIT - 10 (0/0/6/4)
Prerequisite - Diagnostic Test

AIM AND OBJECTIVES OF THE COURSE

- To teach students to listen to statements on well-known topics related to home, study, leisure;
- understand texts on personal and professional topics containing the most frequent words and phrases;
- be able to conduct a conversation on everyday topics; describe your experiences; tell your opinion; retell and evaluate the content of the book you've read, the movie you've seen;
- Be able to create simple texts on known topics, including those related to professional activities.

SHORT DESCRIPTION OF THE COURSE

The language material of the course is selected in such a way that the student, while assimilating the lexical and grammatical minimum, has the opportunity to get acquainted with typical communicative situations and he himself finds himself in such situations, is able to correctly evaluate them and choose the appropriate model (strategy) of speech behavior.

The main emphasis of training is shifted from the process of transferring knowledge to teaching the ability to use the studied language in the course of the implementation of various types of speech activity, such as reading (subject to reading comprehension), listening (under the same condition) and producing texts of a certain complexity with a certain degree of grammatical and lexical correctness.

The material for the classes is selected so that students learning Kazakh / Russian acquire the skills of reading, writing and understanding sounding speech based on the simultaneous mastery of the basics of grammar (phonetics, morphology and syntax) and word usage during constant repeated repetition with the gradual complication of tasks.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE

The student, subject to the active organization of work in the classroom and conscientious completion of homework at the end of the first semester, acquires skills that correspond to the pan-European level A2 (Threshold according to the ALTE classification), that is, he is on the verge of independent language proficiency.

Culturology
CODE - HUM129
CREDIT - 2 (1/0/0/1)
PREREQUISITES - no

PURPOSE AND PURPOSE OF THE COURSE
The purpose of the development of the discipline "Culturology" is the formation of representations of culture as a social phenomenon and philosophical category, the overcoming of simplified-stereotypical attitudes to the diversity of cultural phenomena and processes.

SHORT DESCRIPTION OF THE COURSE
The discipline "Kulturology" is intended to acquaint students with the cultural achievements of man, to understand and master their basic forms and universal laws of formation and development of culture, to the development of their aspirations and skills of self-interest. In the course of culturology are considered the general problems of the theory of culture, leading culturological concepts, universal laws and mechanisms of formation and development of culture, the main historical stages of the formation and development of Kazakhstani culture.

KNOWLEDGE, KNOWLEDGE, LEARNING ABOUT THE END OF THE COURSE
As a result of the development of disciplines "Culturology" students should know:
- basic theories of culture;
- structure and morphology of cultures;
- methods of studying cultural forms, processes and practices of cultures,
- typologies of cultures;
- forms and practices of different cultures;
2. must know:
- logically represent the acquired knowledge;
- to demonstrate understanding of systemic interrelationships within disciplines;
- critically use the basic methods of modern science in the textbook;
- to analyze scientific literary or visual text;
- to bring own independent examples to scientific positions of the course;
- to ensure intercultural dialogue in society.

Physical culture
CODE - HUM129
CREDIT - 8 (0/0/8/0)
PREREQUISITES - no

PURPOSE AND PURPOSE OF THE COURSE
The purpose of the development of the discipline "Physical Culture" is the formation of physical culture of the individual, which provides readiness for social and professional activity, the inclusion in a healthy lifestyle, systematic physical activity.

SHORT DESCRIPTION OF THE COURSE
Theoretical foundations of physical culture. Physical culture in general cultural and professional training of students. Methodical and practical section. Socio-biological bases of physical culture. The basis of a healthy lifestyle of students. Physical culture in ensuring health. General physical and special training in the system of physical education. Basic methods of self-study Physical exercises and self-control of physical exercises and sports.

KNOWLEDGE, KNOWLEDGE, LEARNING ABOUT THE END OF THE COURSE
As a result of mastering the discipline the student should:
To know: influence of health-improving system of physical education on strengthening of health, prevention of professional diseases and bad habits;
- methods of control and assessment of physical development and physical training;
- rules and methods of planning individual activities of different target areas.
To be able to: overcome artificial and natural obstacles with the use of various means of movement;
- to carry out creative work in collective forms of occupations of physical culture;
- to organize the regime of the day in accordance with the criteria of a healthy lifestyle;
- to explain the meaning of volitional qualities, emotions in the formation of psychophysical qualities.
Have skills: use of physical culture to increase resilience to different environmental conditions;
- organization and conduct of individual, collective and family vacations and participation in mass sports competitions.

Philosophy
CODE - HUM124
CREDIT - 3 (1/0/2)
PREREQUISITE - no

GOAL AND OBJECTIVES OF THE COURSE
The formation of social and personal competencies among students on the basis of a humanistic worldview and modern philosophical culture, the development of students' creative thinking, understanding of the philosophical foundations of research in the field of science and technology.
This goal is achieved by solving the following tasks:
1) assimilation of philosophical terminology; 2) understanding the structure of philosophical knowledge and its problems; 3) the development of the wealth of historical and philosophical heritage; 4) the study of modern trends in the development of philosophy; 5) the application of philosophical knowledge to solve problems in various fields of social and professional activity, etc.

SHORT DESCRIPTION OF THE COURSE
Philosophy forms and develops critical and creative thinking, worldview and culture, provides knowledge of the most general and fundamental problems of life and endows them with a methodology for solving various theoretical and practical issues. Philosophy broadens the horizon of vision of the modern world, forms citizenship and patriotism, promotes the development of self-esteem, awareness of the value of human being. She teaches to think and act correctly, develops skills of practical and cognitive activity, helps to search and find ways and means of life in harmony with herself, society, and the world around us.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
The seminars are designed to help solve the general problems of the Philosophy course and the formation of basic philosophical competencies: knowledge of the problems, ideas and personalities of world and national philosophy, the content of the main sections of philosophical knowledge; ability to think critically, reasonably defend their beliefs; the application of philosophical knowledge in the analysis of sociocultural and professional problems and situations; determining the social and humanistic significance of their professional and social activities.

Political science
CODE - HUM128
CREDIT - 2 (1/0/0/1)
PREREQUISITES - no

PURPOSE AND PURPOSE OF THE COURSE
The objectives of the development of the discipline "Political Science" are: the formation of systems of knowledge about the formation and development of political science; a demonstration of the enormous importance of political science in the modern world; formation of civil position.
Tasks of political science - formation of knowledge about politics, political activity; explanation and prediction of political processes and events, political development; development of the conceptual apparatus of political science, methodology and methods of political research.

SHORT DESCRIPTION OF THE COURSE
The process of studying disciplines is aimed at the formation of the following competencies: knowledge of the characteristics of different political systems and functions of political institutions; orientation in the most important political processes occurring in the world and in the country; change in the application of political science in professional activity.

KNOWLEDGE, KNOWLEDGE, LEARNING ABOUT THE END OF THE COURSE
As a result of mastering the disciplines taught:
Learn:
- basic theories of political science; principles of formation and functioning of the political system of society, the basic laws of its development;
- the prerogative of a democratic society;
Remember:
- to understand the peculiarities of the state system and the basic types of political and party systems;
- to be free to orient in the political ideologies of the modern world;
- competently form your civic position;
Take:
- key concepts and methods that allow publications to analyze publications on political topics.

Psychology
CODE - HUM122
CREDIT - 2 (1/0/0/1)
PREREQUISITES - no

PURPOSE AND PURPOSE OF THE COURSE
The subject of psychology is the study of the psyche of man. But the psyche comes not only to man, he has it and in animals.
The main task of psychology as science is the study of the peculiarities of the formation, development and manifestation of mental phenomena and processes.

SHORT DESCRIPTION OF THE COURSE
The subject of psychology is a person as a subject of activity, systemic qualities of his self-regulation; regularity of the formation and functioning of the psyche of man: his ability to reflect the world, to recognize him and to regulate his interaction with him. The object of psychology is the regularity of the psyche as a special form of human life and behavior of animals. This form of vitality in connection with its multifacetedness can be studied in the most diverse aspects, which are studied in different areas of psychological science.

KNOWLEDGE, KNOWLEDGE, LEARNING ABOUT THE END OF THE COURSE
As a result of studying the discipline, the student should know:
- Theoretical foundations of general psychology;
- mental structure;
- content and structure of activities;
- the content and basic regularities of the functioning of mental cognitive emotional and volitional processes, the content of mental personality traits;
- content of interrelationships and communication of students;
- regularity of the organization of optimal training and interaction of students in the group;
- The main directions of the impact on personality and the means of regulating the process of mental development.
must know:
- to analyze professional and pedagogical situations, to choose purposeful and psychologically justified means for solving practical tasks;
- design and organize communicative interactions and communication management;
- to analyze own activity, interrelationships in scientific and pedagogical collectives, personal peculiarities with the purpose of their perfection.
must own:
- methods of interaction with other subjects of the educational process;

- methods of establishing contacts and supporting interaction with the subjects of the educational process in the conditions of multicultural educational environment;
- skills of socio-psychological analysis and resolution of specific professional situations.

Modern history of Kazakhstan
CODE - HUM100
CREDIT - 5 (1/0/2/2)
PREREQUISITES - no

PURPOSE AND PURPOSE OF THE COURSE
The purpose of the course is the acquaintance of students with technical specialties with the main theoretical and practical achievements of domestic historical science on the problems of the history of modern Kazakhstan, a comprehensive and systematic study of the basic principles.
- to analyze the peculiarities and contradictions of the history of Kazakhstan in the Soviet period;
- to reveal the historical content of the laws of political, socio-economic, cultural processes at the stages of the establishment of an independent state;
- to contribute to the formation of the civic position of students;
- to educate students in the spirit of patriotism and tolerance, devotion to their people, Fatherland.

SHORT DESCRIPTION OF THE COURSE
The course Modern History of Kazakhstan is an independent discipline and covers the period from the beginning of the twentieth century to our days. Modern history of Kazakhstan studies the national liberation movement of the Kazakh intelligentsia in the early twentieth century, the period of creation of the Kazakh ASSR, as well as the process of multinational formation

KNOWLEDGE, KNOWLEDGE, LEARNING ABOUT THE END OF THE COURSE
- knowledge of events, facts and phenomena of modern history of Kazakhstan;
- knowledge of the history of ethnic groups inhabiting Kazakhstan;
- knowledge of the main stages of the formation of the Kazakh statehood;
- ability to analyze complex historical events and predict their further development;
- ability to work with all types of historical sources;
- reduction of writing essays and scientific articles on the history of the Fatherland;
- ability to operate on historical concepts;
- change the news of the discussion;
- skills of independent analysis of historical facts, events and phenomena;
- skills of public speech.

Fundamentals of entrepreneurship, leadership and anti-corruption culture
CODE - MNG487
CREDIT - 3 (1/0/1/1)
PREREQUISITES - no

PURPOSE AND PURPOSE OF THE COURSE
The purpose of the discipline is the acquisition of practical skills in the implementation of entrepreneurial activity, acquaintance with theories and types of leadership, and understanding the basics of anti-corruption culture.

SHORT DESCRIPTION OF THE COURSE
Students will study the theory and practice of entrepreneurship as a system of economic, organizational and legal relations of business structure. They will develop their leadership skills and work skills in a team. They will also study the causes of corruption and methods of struggle with it.

KNOWLEDGE, KNOWLEDGE, LEARNING ABOUT THE END OF THE COURSE
As a result of mastering the discipline of the student:
1. to know:
- questions of discipline in the volume, necessary for the decision of professional tasks;
- the mechanism of entrepreneurship with the accumulated experience of the development of theory and practice;
- application of civil legislation governing the organization of entrepreneurial activity;
- basic concepts and terms.
2. must know:
- to choose the organizational and legal form of the enterprise on the basis of the purposes of the enterprise and the peculiarities of the organization and functioning of the enterprises in different forms;
- to evaluate the effectiveness of entrepreneurial activity;
- assess external and internal risks for the enterprise;
- to develop business plans with accounting of normative-legal, resource, administrative and other conditions.
3. must own:
- methods of activity planning and evaluation of entrepreneurial activity, methods of assessment of business cost;
- methods of protection of entrepreneurs from attractions on their assets

Sociology
CODE - HUM127
CREDIT - 2 (1/0/0/1)
PREREQUISITES - no

PURPOSE AND PURPOSE OF THE COURSE
Celyu prepodavanïya course "Sociology" GX prïobretenïe stwdentamï navıkov samostoyatelnogo analïtïçeskogo distances from mışlenïya gwmanïtarnogo knowledge, ovladenïe prïncïpamï racïonalnogo approaches to process and trends ïzmenyayuşçegosya society, Development Students texnïçeskogo profile capacity, creative mıslït argwmentïrovanno vırajat Svoik is conceivable, wmet pravïlno sformwlïrovat problemw and predstavït logïçeskï a trusted solution.

SHORT DESCRIPTION OF THE COURSE
The science of society, which constitutes its systems and laws of its functioning and development, social institutions, relations, communities and groups. Sociology studies society, revealing the internal mechanisms of its structure and development of its structure (structural elements: social communities, institutions, organizations and groups); regularity of social actions and mass behavior of people, as well as the relationship between personality and society.

KNOWLEDGE, KNOWLEDGE, LEARNING ABOUT THE END OF THE COURSE
The student must know: - the subject, structure and functions of sociology, the basic laws and categories of the studied discipline;
- the main stages of socio-cultural development of society and factors of social development;
- essence and forms of social interactions and relations;
- specifics of interethnic relations in groups; specificity of formal and informal relations; nature of leadership and functional responsibility;
- Mechanisms of emergence and resolution of social conflicts, regulation of interaction of social communities, groups and ethnic groups.
To be able to: solve typical mathematical tasks used in the adoption of managerial creativity to apply the basics of sociological knowledge in the service and professional activity and analysis of various social phenomena;
- work independently on sources and literature in the systematization
and deepening of their sociological knowledge.
Own: methods of sociological analysis and forecasting of social (public) situations; sufficient argumentation of explanations and confirmation of various sociological situations.

Safety of life
CODE - CHE451
CREDIT - 2 (1/0/0/1)
PREREQUISITES - no

PURPOSE AND PURPOSE OF THE COURSE
Goal "discipline" Security jïznedeyatelnostï sformïrovat Students sposobnost raspoznavat and ocenïvat Negative human factor Mid obïtanïya, Human determine posledstvïya vrednıx and porajayuşçïx factors, oswşçestvlenïya nadejnıx fire security of methods NIH, Custom optïmalnogo solutions and pravïlnogo Behaviors, Security and Life Saving Prix çrezvıçaynıx situations of natural, man-made and social character.
Tasks of mastering educational disciplines: acquisition of understanding of the problem of sustainable development, ensuring life safety and reducing risks associated with human activity; formation of a culture of professional safety, skills of identification of risks and assessment of risks in the field of professional activity

KNOWLEDGE, KNOWLEDGE, LEARNING ABOUT THE END OF THE COURSE
As a result of studying the discipline, the student should know:
- the main technospheric hazards, their properties and characteristics,
- the nature of the impact of dangerous and harmful factors on man and nature, methods of protection from them;
- specificity and mechanism of toxic effects of harmful substances, energy effects and combined action of factors;
- technical and organizational basis for ensuring the safety of production processes, the sustainability of production in emergency situations;
- Theoretical foundations of life safety; the current system of normative and legal acts in the field of technospheric security;
- security management system;
to remember:
- - identify the main hazards of human habitation, assess the risks of their implementation, choose methods of protection from hazards and ways to ensure comfortable living conditions;
- to use the main means of quality control of living conditions;
- apply the methods of analysis of the impact of man and his activities on the environment;
to own:
- - legislative and legal acts in the field of safety and protection of the environment, requirements to safety of technical regulations;
- methods and technologies of protection in emergency situations;
- conceptual and terminological apparatus in the field of security; methods of ensuring the safety of the environment.

Ecology and sustainable development
CODE - CHE452
CREDIT - 2 (1/0/0/1)
PREREQUISITES - no

PURPOSE AND PURPOSE OF THE COURSE
The purpose of the study of disciplines is the study of students of global environmental problems of the 21st century, the preconditions, ideas and methods of transition to sustainable development in world practice. Discipline allows you to form knowledge about the concept of sustainable development and the main ways of transition to it at the global, regional and local levels.
Tasks:
- to understand the causes of emergencies and the development of global environmental problems;
- master the basic terms and definitions of theories of sustainable development;
- acquire practical skills in the field of development and implementation of long-term development programs.
- to systematically approach the solution of ecological problems in the context of global problems of social development;
- to form in students a holistic worldview and an active civic position for a clearer understanding of the role and mission of environmental specialists in solving modern problems of environmental protection and rational use of nature

SHORT DESCRIPTION OF THE COURSE
The discipline studies global environmental problems and interacts with common development problems; consequences of population growth and consumption of natural resources; conditions of stable existence on Earth; mission of environmental specialists in solving modern environmental problems; environmental consequences of depletion of natural resources and pollution of the environment.

KNOWLEDGE, KNOWLEDGE, LEARNING ABOUT THE END OF THE COURSE
Learn:
- the basis of the concept of sustainable development as a strategy for global human development;
- the history of the emergence of the concept of sustainable development and the formation of its modern concept;
Understand:
- methodology of construction and calculation of the system of indicators of sustainable development;
Remember:
- characterize natural and anthropogenic factors of instability in the biosphere,

- the consequences of human impact on the biosphere.

Mathematics I
CODE - MAT00121
CREDIT - 5 (1/0/2/2)
REQUISITES - no

GOAL AND OBJECTIVES OF THE COURSE
The main goal of the course is to give the future specialist a certain amount of knowledge on the sections of the course "Mathematics-I", necessary for the study of related engineering disciplines. To introduce students to the ideas and concepts of mathematical analysis. The main attention should be paid to the formation of basic knowledge and skills with a high degree of their understanding of differential and integral calculus.
Course Objectives:
the acquisition of knowledge necessary for the effective use of rapidly developing mathematical methods; gaining the skill of building and researching mathematical models; mastery of the fundamental branches of mathematics necessary to solve scientific research and practical problems in the professional field.

SHORT DESCRIPTION OF THE COURSE
The course "Mathematics-I" presents the sections: an introduction to analysis, differential and integral calculus

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
Studying this discipline will allow students to apply the course “Mathematics-I” to solving simple practical problems, find tools sufficient for their research, and obtain numerical results in some standard situations.

Mathematics II
CODE - MAT00122
CREDIT - 5 (1/0/2/2)
PREREQUISITE - Mathematics 1

GOAL AND OBJECTIVES OF THE COURSE
The purpose of teaching the course "Mathematics II" is the formation among bachelors of ideas about modern mathematics as a whole as a logically harmonious system of theoretical knowledge.
The objectives of the course are to instill in students solid skills in solving mathematical problems with bringing the solution to an almost acceptable result. To develop primary skills in mathematical research of applied issues and the ability to independently understand the mathematical apparatus contained in the literature related to the student's specialty.

SHORT DESCRIPTION OF THE COURSE
The course "Mathematics II" provides an accessible presentation of the sections: elements of linear algebra and analytic geometry, differential calculus of functions of many variables, multiple integrals. "Mathematics II" is a logical continuation of the course "Mathematics I".

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
The *study* of this *discipline* will make it possible to put into practice the theoretical knowledge and skills obtained with a high degree of understanding of the sections of the course, to use them at the appropriate level; translate into mathematical language the simplest problems posed in terms of other subject areas; acquire new mathematical knowledge using educational and information technologies; solve applied problems in the field of professional activity

Mathematics III
CODE - MAT00123
CREDIT - 5 (1/0/2/2)
PREREQUISITE - Mathematics 1, Mathematics II

GOAL AND OBJECTIVES OF THE COURSE
The purpose of teaching the course "Mathematics III" is the formation of basic knowledge and skills with a high degree of understanding of the sections of the course, helping to analyze and solve theoretical and practical problems.
Course objectives: instilling in students the ability to independently study the educational literature, conduct probabilistic and statistical analysis of applied problems; development of logical thinking and raising the general level of mathematical culture.
SHORT DESCRIPTION OF THE COURSE
The course "Mathematics III" includes sections: theory of series, elements of probability theory and mathematical statistics and is a logical continuation of the discipline "Mathematics II".

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
Student
must know:
- number series theory;
- theory of functional series;
- Fourier series;
-elements of probability theory and mathematical statistics;
should be able to:
- solve problems in all sections of series theory;
- find the probabilities of events;
- find the numerical characteristics of random variables;
- use statistical methods to process experimental data;

Physics I, II
CODE - PHYS111-112
CREDIT - 10 (2/2/2/4)
PREREQUISITE - no

GOAL AND OBJECTIVES OF THE COURSE
the main purpose of teaching the course Physics I and Physics II is to form ideas about the modern physical picture of the world and the scientific worldview.

SHORT DESCRIPTION OF THE COURSE
The disciplines of Physics I and Physics II are the basis of theoretical preparation for the engineering and technical activities of graduates of a higher technical school and represent the core of the physical knowledge necessary for an engineer operating in the world of physical laws. The course "Physics 1" includes sections: the physical foundations of mechanics, the structure of matter and thermodynamics, electrostatics and electrodynamics. The discipline "Physics II" is a logical continuation of the study of the discipline "Physics 1", and forms a holistic view of the course of general physics as one of the basic components of the general theoretical training of bachelors of engineering and technical profile. The discipline "Physics II" includes sections: magnetism, optics, nanostructures, the basics of quantum physics, atomic and nuclear physics.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
- the ability to use knowledge of fundamental laws, theories of classical and modern physics, as well as the use of physical research methods as the basis of a system of professional activity.

Engineering and computer graphics
CODE - GEN 177
CREDIT - 5 (1/2/0/2)
PREREQUISITE - no

GOAL AND OBJECTIVES OF THE COURSE
Acquisition of skills to work with graphic design systems, acquisition of skills in the field of creating and reading graphic documentation, which allows to study other graphic systems and necessary in subsequent engineering activities.

SHORT DESCRIPTION OF THE COURSE
The course develops the following skills in students: to depict all kinds of combinations of geometric shapes on a plane, to conduct research and their measurements, allowing for image transformations; create technical drawings, which are the main and reliable means of information, providing a link between the designer and the designer, technologist, builder. Introduces students to the basics of automated preparation of the graphic part of design documents in AutoCAD.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
A student who has successfully completed the course must:
1. Have an idea about graphic systems, about machine representation and creation of objects. 2. To navigate in the field of computer modeling and design of flat and three-dimensional models.

Information and communications technology (English)
CODE - CSE 174
CREDIT - 5 (2/1/0/2)
Prerequisite - no

AIM AND OBJECTIVES OF THE COURSE
- Training in the use of modern information technologies in the field of professional activity. The objectives of the course include:
- To reveal the basic concepts of architecture of computer systems;
- To reveal the basic concepts of information and communication technologies and subject terminology;
- To teach how to work with software interfaces of operating systems;
- To teach how to work with data in a different representation, both tabular structured and unstructured;
- To teach to apply the basic principles of information security;
- Expand the concepts of data formats and multimedia content. Learn to work with typical multimedia data processing applications. Use modern approaches to presenting material;
- To reveal the concepts of modern social, cloud and email platforms and how to work with them;
- To teach how to use the methods of algorithmization and programming to solve tasks of automating business processes

SHORT DESCRIPTION OF THE COURSE
The course contains a training program aimed at leveling the basic knowledge of students in the field of information and communication technologies. It contains a full range of topics, according to the GOSO Model Curriculum, with a predominance of educating practical skills in working with data, algorithmization and programming. The course is designed in such a way as to teach students not only the basic concepts of architecture and modern infrastructure of information and communication technologies, but also to teach how to use these tools to solve applied problems. To teach you how to optimize processes, apply adequate models and methods for solving practical problems using modern methods and tools of information technology, automate routine processes, be productive and efficient.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
Students will know:
- Computer device;
- Architecture of computer systems;
- Infrastructure of information and communication technologies;
- Interfaces of modern operating systems;

- Modern tools for working with data of various nature and purpose;
- Types of threats to information security, principles, tools and methods of data protection;
- Python programming language.

Students will be able to:

- Work with interfaces of modern operating systems;
- Work with modern application software for working with data of various nature and purpose;
- Apply modern social, cloud, email platforms for organizing business processes;
- Program in an algorithmic programming language;
- Analyze, model, design, implement, test and evaluate information and communication technology systems

Geoinformation technologies in geology
CODE – GEO436
CREDIT - 5 (2/1/0/2)
Prerequisite – no

GOAL AND OBJECTIVES OF THE COURSE
The purpose of the course: to provide theoretical and practical knowledge in the field of geographic information technology in relation to the tasks of geology. Development of practical skills in modern geographic information systems.
Course Objective: When studying the discipline, specialists must learn digital data processing technologies, technologies for creating and updating information databases, creating digital geological maps and plans

SHORT DESCRIPTION OF THE COURSE
The concept of geoinformatics. The concept of spatially-linked information and the main methods of obtaining it. Data of geographic information systems and methods of creating a digital basis for geographic information systems. GIS software. Technologies for creating maps of geological content in geographic information systems. The remote basis of geological mapping.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
As a result of mastering the discipline, students should
1) know:
- principles and methods of mathematical modeling in geology; main types of models and features of their application; computer analysis of geographic information;
- geographic information systems in geological mapping;
2) be able to:
- simulate the properties of geological objects;
- make maps for various purposes using GIS technologies
3) own skills:
- construction of mathematical, physical and chemical models in solving production problems;
- Mapping using GIS technology.

General chemistry
CODE – CHE495
CREDIT - 5 (1/1/1/2)
Prerequisite - no

AIM AND OBJECTIVES OF THE COURSE
The purpose of the course: The formation of knowledge on the fundamental issues of general chemistry and the skills of their application in professional activities.
Course Objective:
- transfer the basic theoretical knowledge of the course of chemistry;
- help students gain skills in laboratory work;
- teach to solve typical problems and paint the reaction equations;
- which contributes to the informal assimilation of theoretical material;
- to form students' chemical thinking skills.

SHORT DESCRIPTION OF THE COURSE
The course "General Chemistry" considers the laws, theoretical principles and conclusions that underlie all chemical disciplines, studies the properties and relationships of chemical elements based on the periodic law of D.I. Mendeleev and on modern ideas about the structure of matter, the basics of chemical thermodynamics and kinetics, processes in solutions, the structure of complex compounds.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
As a result of mastering the discipline, students should
1) know:
- basic chemical laws and concepts,
- various chemical systems,
- the main laws of chemical reactions,
- the reactivity of substances based on knowledge of the structure of atoms, the periodic system of elements and chemical bonds.
2) be able to:
- solve problems using acquired knowledge,
- paint the reaction equations,
- make calculations using basic chemical laws.
3. own skills:
- navigate the basic concepts of chemistry, the properties of non-metal elements and metals of the groups of the periodic system;
- to acquire skills in drawing up chemical equations, solving problems, explaining the properties of elements and their compounds based on the laws of chemistry, conducting chemical experiments and explaining the phenomena that take place.

General and historical geology
CODE – GEO461
CREDIT - 5 (2/1/0/2)
Prerequisite - no

AIM AND OBJECTIVES OF THE COURSE
The purpose of the course: developing a geological worldview among students; creating the basis for further obtaining special knowledge, skills in the process of studying all subsequent geological disciplines.
Course objective: obtaining general ideas about the structure of the Universe, the internal structure of the Earth, the geological activity of the main factors of its external and internal dynamics, the form of occurrence of geological bodies, tectonic movements and methods of their study, the basic structures of the earth's crust.

SHORT DESCRIPTION OF THE COURSE
The course examines the geological structure of the earth's crust; material (chemical, mineral, and petrographic) composition of the earth's crust; the main structural elements of the earth's crust with characteristic rock complexes; the main results of the most important endogenous and exogenous geological processes and their role in the formation of the earth's crust; forms of occurrence of geological bodies in the earth's crust, types of tectonic disturbances; methods for their representation on geological maps and sections, the concept of a geochronological (stratigraphic) scale.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
As a result of mastering the discipline, students should
1) know: the internal structure of the Earth,
- geological activity of the main factors of its external and internal dynamics,
- forms of occurrence of geological bodies, tectonic movements and methods for studying them, types of structures of tectono and lithosphere.
2) be able to:
- independently determine the most common minerals and rocks and explain their genesis;
- recognize simple tectonic structures, geological bodies and landforms;
3. own skills:
- work with a mountain compass;
- construction of geological maps of simple structure and geological sections;
- reading simple geological maps.

Structural geology
CODE - GEO432
CREDIT - 5 (2/1/0/2)
Prerequisite – GEO431 General and Historical Geology

AIM AND OBJECTIVES OF THE COURSE
The purpose of the course: structural geology studies various forms of occurrence of rocks, their location and relationships, formation conditions in the earth's crust. The completion of the discipline is a term paper. It aims to reinforce skills in reading geological maps. Based on an in-depth analysis of the geological tablet, an explanatory note is compiled, illustrated with graphical applications (maps, sections). Finished term papers after verification by their supervisor are protected by contractors and are accepted with a differentiated assessment.
Course Objective:
- study of the form of occurrence of rocks in the earth's crust;
- methods for compiling and reading geological, tectonic and structural maps,
- construction of geological sections and block diagrams, stratigraphic columns

SHORT DESCRIPTION OF THE COURSE
The course "Structural Geology" studies the forms of geological bodies, undisturbed horizontally lying layers, deformations of rock formations, the formation of layers under the influence of endogenous, exogenous and cosmic factors; basic elements of folds, typification of folds, folded forms of high ranks (anteclise, syneclise, etc.); basic elements of discontinuous dislocations, their typification; kinematic types of faults (faults, faults, faults, etc.); features of the manifestation of deformations on platforms, in folded belts, rifts and other global tectonic structures

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
As a result of mastering the discipline, students should
1) know:
- the forms of occurrence of geological bodies in the earth's crust and the patterns of their location and combination, as well as the geological conditions of formation;
- methods for compiling and reading geological, tectonic and structural maps, geological sections and block diagrams, stratigraphic columns;
- on the close connection of studying the structural forms of geological bodies with the practice of exploration and theoretical geology.
2) be able to:
- determine the elements of occurrence of rock formations using a mountain compass (strike azimuth, dip angle, etc.);
- according to well drilling data, using structural maps; display folded shapes and discontinuous dislocations on geological maps and sections;

- use general and special computer programs for processing structural and geological information;
- read geological maps, build geological sections, stratigraphic columns,
- correctly describe the geological structure of the area according to the geological map in accordance with the scheme of the production report.

3) own skills:
- study of morphometry of structural forms,
- development of their classification in connection with the natural distribution and combination in the earth's crust to a depth and area;
- analysis of the geological, tectonic structure of the area and understanding of the history of the geological development of the area.

Crystallography and mineralogy
CODE - GEO433
CREDIT - 5 (2/1/0/2)
Prerequisite - GEO431 General and historical geology

AIM AND OBJECTIVES OF THE COURSE
Course objective: Students gaining knowledge on the main theoretical and applied issues of crystallography and mineralogy, which is the fundamental geological discipline that underlies the study of rocks, ore and non-metallic minerals, processes that occur in the earth's crust, as well as in space bodies
Course Objective:
- mastering the fundamentals of crystallography, which is closely connected with industry, the development of which requires specialists to have in-depth knowledge in the field of crystallography;
- the acquisition of skills in determining the elements of symmetry in crystalline polyhedra, in recognizing simple forms that are found in nature;
- knowledge of the methods of visual diagnosis of common minerals;
- gaining knowledge on the diagnosis of minerals by morphological features;
- the ability to use paragenetic associations of minerals for the diagnosis of minerals;
- gaining knowledge on the conditions for the formation of major minerals.

SHORT DESCRIPTION OF THE COURSE
The course "Crystallography and Mineralogy" studies the basic concepts and laws of crystallography; classification of crystals based on their symmetry; geometric crystallography, which studies the external and internal structure of crystals; crystal chemistry or structural chemistry; crystallophysics. He understands the influence of the structure on the external form and physical properties of crystals, the main motives for constructing structures are wire-frame, sheet, ribbon, chain, with isolated groups of atoms; conditions of origin and location of minerals in nature; the main groups of minerals, their composition, physical properties and practical application, mineral formation processes and the corresponding mineral paragenesis; basic laws of the crystal structure, external forms, chemical composition, physical properties and conditions for the formation of crystals in the relationship.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
As a result of mastering the discipline, students should
1) know:
- the history of crystallography and mineralogy as a science, the relationship with other exact and natural sciences, the main modern problems and development prospects, the basic laws of crystallography;

- the state of aggregation of a mineral as a solid, the concept of a crystal and crystalline substance, their basic properties;
- symmetry and classification of crystals;
- common simple forms of crystals, their parameters and indices, combinations of simple forms;
- the fundamentals of the theory of crystal growth, factors affecting crystal growth, the shape of real crystals;
- general theoretical concepts of the basics of mineralogy, determination of the mineral and its chemical composition, physical properties4
- geological processes of mineral formation, basic terms and definitions;
- principles of classification of minerals.

2) be able to:
- identify the natural crystal of the mineral, its genetic affiliation;
- apply the methods of visual diagnosis of the mineral, determine the common ore and rock-forming minerals in the samples;
- analyze the paragenetic association of the mineral and reconstruct the chemistry of the mineral formation environment.

3) own skills:
- methods for determining the symmetry of crystals, their crystallographic classification, parameters and indices of simple forms;
- methods of visual diagnosis of minerals, analysis of paragenetic associations;
- methods for the diagnosis of minerals, including the determination of their crystallomorphological, physical properties, analysis of mineral associations and the chemistry of the environment of mineral formation.

Petrography
CODE – GEO434
CREDIT – 5 (1/2/0/2)
PRE-REQUISITE – GEO433 Crystallography and mineralogy

COURSE GOALS AND OBJECTIVES
The purpose of the course: comprehensive knowledge of the composition, structure, structure and texture, classification of igneous, sedimentary, metamorphic, metasomatic rocks, nomenclature and conditions of formation of rocks and their connection with mineral deposits.
Course objective:
- Study of igneous rocks: formation, material composition and structure. Structures and textures of igneous rocks.
- Study of sedimentary rocks: formation, material composition, structure. Textures and structures of sedimentary rocks. Classification of sedimentary rocks.
- Study of metamorphic rocks: factors and types of metamorphism, material composition, structure. Textures and structures of metamorphic rocks.
Types of metamorphism: cataclastic, contact-thermal, regional, metasomatosis.

SHORT DESCRIPTION OF THE COURSE
The course "Petrography" studies the composition, structure, conditions of occurrence, classification and regularities of formation of igneous, sedimentary, metamorphic and metasomatic rocks that meet the current level of science and the requirements of geological practice. Understands the connection of petrography with other geological disciplines and its significance for geological survey, prospecting and exploration of mineral deposits; applies methods of rock research; the main problems and tasks of petrography.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students must
1) know:
– the structure of the Earth, the history of the geological development of the planet,
- main geological processes, fundamentals of petrography
– the most important types of rocks of igneous, sedimentary and metamorphic Genesis,
- their systematics,
– evaluating conditions for the formation of,
–diagnostic method
2) be able to:
- explain the origin of the most common minerals and rocks, landforms, and elementary geological structures;
– use a petrographic information for the restoration of processes of formation of rocks

3) possess skills:
- skills in determining the types of rocks and minerals
- identify the main types of rocks by their appearance, describe the composition, structure, and texture of rocks.

Geology and Mineral Resources of Kazakhstan
CODE – GEO435
CREDIT – 5 (2/1/0/2)
PRE-REQUISITE – GEO432 Structural geology

COURSE GOALS AND OBJECTIVES
The purpose of the course: to Form a holistic view of the geological structure and development of the earth's crust within the territory of Kazakhstan, to get acquainted with the main types of mineral resources, their availability in the country in the future and priorities in the mineral resource complex.
Course objective:
- study of the geological structure of the subsoil of Kazakhstan;
- familiarity with the basic principles of tectonic zoning of the territory of Kazakhstan;
- familiarity with the main tectonic structures of the earth's crust, their stratigraphy and magmatic complexes, features and patterns of geological development and placement of mineral deposits in them.
The main task of studying the discipline is to develop students of geologists ' geological thinking based on an extensive database of factual material with the ability to correctly structure it and use it in accordance with the logic of the fundamental conceptual geological paradigms.
study of the form of rock occurrence in the earth's crust;

SHORT DESCRIPTION OF THE COURSE
The article gives an idea of the geological structure of the subsoil and the development of the earth's crust within the territory of Kazakhstan, about the mineral resources of Kazakhstan, their classification, reserves, priority and strategic types of raw materials. Tasks of the geological survey of Kazakhstan at the present stage. The course contains information about the main types of mineral resources, the country's future supply of them, and priorities in the mineral resource complex.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students must
1) know: about the features of the geological structure and history of the earth's crust of the territory of Kazakhstan, know the main types of mineral resources of the Republic, the degree of security of the country at the present time and in the future. Know the principles of tectonic zoning of the territory of Kazakhstan, the main structural elements of the earth's crust of this territory, the main types of minerals and General patterns of placement of their deposits within the Republic.
2) be able to: analyze the geological structure of any part of the earth's crust, make its complete characteristic and interpret the conditions of its development in time and space.

3) have the skills to draw up geological sections and tectonic maps of various scales, read and draw up schematic geological maps of various contents.

Geodesy with the basics of topography
CODE – MAP 113
CREDITS – 5 (2/0/1/2)
PREREQUISITE – Mathematics

COURSE GOALS AND OBJECTIVES
The purpose of the course: to get acquainted with the basics of water supply and irrigation, to familiarize them with the current regulatory and technical documents in the relevant departments that regulate the process of water use.
Course objective:
- theoretical foundations for studying hydrogeological and reclamation processes associated with irrigation;
- methods of hydrogeological and reclamation zoning and assessment of the territory in terms of its suitability for irrigation reclamation;
- basics of typification of natural and climatic conditions of reclaimed territories;
- various irrigation systems, elements, types and methods of irrigation;
- basic methods of irrigation of agricultural crops, requirements for the quality of irrigation water, hydrogeological and reclamation processes on irrigated lands, salinization of lands and methods of their salinization.

SHORT DESCRIPTION OF THE COURSE
Characteristics of natural water sources. Classification of water supply types and their characteristics. Underground water intakes. Hydrogeological calculation of groundwater intakes. Filters for tubular wells. Preparation of drinking water. Organization and calculation of sanitary protection zones. Land reclamation. Methods of land irrigation. Calculation of irrigation systems. Irrigation regime. Use for irrigation of underground water.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students must
1) know:
- the basis for the organization of water supply and irrigation,
- regulatory and technical documents in force in the relevant departments that regulate the process of water use.
2) be able to:
- calculate irrigation systems.
3) possess skills:
- organization of water supply and irrigation.

Sedimentology
CODE – GEO439
CREDIT - 5 (2/1/0/2)
Prerequisite – GPH431 General And Historical Geology

GOAL AND OBJECTIVES OF THE COURSE
The purpose of the course: to give students the basics of knowledge in sedimentology as a science that studies sediment, its composition, structure, composition, origin, distribution and evolution.
Course objective: When studying the discipline, specialists must learn the methodology of studying precipitation and sedimentary rocks, understand the basics of facies analysis, paleogeographic research methods.

SHORT DESCRIPTION OF THE COURSE
The course "Sedimentology" gives an idea of the subject of science, goals, objectives, place among other geological sciences. The discipline sets out information about precipitation, their elemental, chemical, mineral and component composition. The questions of sediment mobilization, transportation, differentiation and accumulation are considered. We study the texture and structural features, facies environments and conditions for the formation of sedimentary rocks.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
As a result of mastering the discipline, students should
1) know:
- History, problems, prospects and directions of development of science;
- signs of precipitation and sedimentary rocks, as products of the Earth's exosphere;
- Methodology for the study of precipitation and modern methods for their study;
- instruments and technologies of field and laboratory, including crystal-optical diagnostics of precipitation components;
- material composition of precipitation, texture and structural features;
- the basic properties of sedimentary formations, including their reservoir properties;
- features of the formation of sediments and sedimentary rocks;
- the influence of ancient and modern landscape and climatic conditions on the formation of sedimentary rocks;
- methods of paleogeographic research;
- basics of facial analysis;
- the basic physical and mechanical properties of sediments and sedimentary rocks;
2) be able to:
- identify and describe the material and structural-texture features of sediments and sedimentary rocks;
- classify and diagnose sedimentary rocks of various genesis;

- use the crystal-optical method for the study of sedimentary rocks, as one of the leading methods;

3) own skills:

- the use of the granulometric method for the study of sedimentary rocks for the nomenclature and genetic interpretation of the conditions of their formation;
- analysis of landscape facies of sediment formation in the general genesis of rocks, using their structural and texture features and material composition

Geophysical methods of search and exploration
CODE – GE0411
CREDIT – 5 (2/1/0/2)
PREREQUISITE – not

GOAL AND OBJECTIVES OF THE COURSE
Course goal: Geophysical methods of prospecting and exploration are widely used in solving problems of geological mapping, prospecting and exploration of ore deposits, non-metallic raw materials and hydrocarbons
Course objective:
As a result of studying this course, the geologist must learn the basics of geophysical methods, the principles of measuring equipment, acquire skills of independent work with geophysical materials, learn how to conduct their qualitative, and in some cases, quantitative interpretation. The most important thing for a geologist is the ability to creatively apply geological knowledge to explain the causes of geophysical anomalies.

SHORT DESCRIPTION OF THE COURSE
The physical and geological foundations, methods and techniques of work, processing and interpretation of the results of field and geophysical methods (electrical, magnetic, gravity, seismic, radiometry and nuclear Geophysics) are described. The physical properties of rocks and the nature of the physical fields associated with them are considered. The principles of operation and device of geophysical equipment, methods of performing field measurements and processing the received data are described, and the scope of application is specified. Field geophysical measuring instruments require students to have knowledge of electrical engineering and electronic measurement systems. In terms of the volume of collected field geophysical data, their processing and interpretation requires the use of computer technologies.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students should
1) know:
- modern ideas about the geological nature of geophysical anomalies;
- methods of field geophysical work used in the search for mineral deposits;
- main methods of processing and interpretation of the obtained geophysical materials;

fundamentals of forecasting oil and gas potential from geophysical data;
2) be able to:
- formulate tasks and justify the formulation of various types of field geophysical research;
- process, analyze and systematize field geophysical information using modern methods of its automated collection, storage and processing;

- use geophysical data to make a forecast for the area under study;
- 3) possess skills:
- methods of quantitative and qualitative analysis of geophysical fields;
- skills for critical evaluation of scientific and technical information.

Drilling of the wells
CODE – PET406
CREDIT – 5 (2/1/0/2)
PRE-REQUISITE – no

COURSE GOALS AND OBJECTIVES
The purpose of the course is to study the methods of drilling exploration, technical and water wells; the basics of well drilling technology; possible complications that occur during drilling and affect their operation in the future; possible reserves for improving the quality of wells and reducing their cost.
The objective of the course: to acquire knowledge in the field of development of well construction technology, well design and drilling modes, justification of the used washing liquid, cementing parameters.

SHORT DESCRIPTION OF THE COURSE
The discipline "drilling wells" plays an important role in the formation of specialists who will be engaged in the search and exploration of mineral deposits for oil, gas, fresh and mineral waters, as well as for solid minerals. Knowledge of this discipline allows you to correctly determine the physical and mechanical properties of rocks, choose the most rational rock-breaking tools (bits, drill bits) and technical means for selecting the core from wells, analyze the phenomena occurring in the process of forming a well, predict the performance of bits and drill columns.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students must
1) know:
- basic terms and definitions, well design, well classifications;
- history, problems and prospects of development of well drilling technology;
- technological processes of the production process of well construction;
- methodology for designing the well structure, calculating casing strings and plugging the main technological processes.
2) be able to:
- apply methods for modeling technological processes of drilling wells;
- calculation of the well construction;
- to develop the technology of drilling wells;
3) possess skills:
- methods for constructing simple mathematical models of typical professional problems;
- mathematical methods for solving natural science problems;
- prepare and execute scientific, technical and service documentation.

Geology of mineral deposits
CODE – GEO438
CREDIT – 5 (2/1/0/2)
PREREQUISITE – GEO431 General and Historical geology

GOAL AND OBJECTIVES OF THE COURSE
Course goal: study of the Geology of mineral deposits, conditions for the formation of endogenous, exogenous and metamorphogenic deposits
Course objective:
- study of geological and physical-chemical processes of ore formation and conditions of formation of deposits;
- study of the geological structure of deposits, conditions of occurrence and morphology of ore bodies;
- study of typomorphic features of deposits of different genetic types;
- study of the mineral composition of ores, textures and structures of ores of endogenous, exogenous and metamorphogenic deposits;
- familiarization with typical examples of industrial and genetic types of mineral deposits.

SHORT DESCRIPTION OF THE COURSE
Study of the geology of mineral deposits; the formation conditions of endogenous, exogenous and metamorphic deposits; a geological and physico-chemical processes of ore formation; the geological structure of the deposits, occurrence conditions and morphology of ore bodies; ore mineral composition, textures and structures of ores of endogenic, exogenic and metamorphic deposits; industrial-genetic types of mineral deposits and regularities of their distribution for geological prediction and definition of a rational complex of methods of searches and prospecting of deposits.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students should
1) know: geological, physical and chemical conditions for the formation of various genetic types of mineral deposits, their relationship to certain structural and material complexes of rocks, the mineral composition of ores and classic examples of deposits.
2) be able to: distinguish genetic groups and classes of mineral deposits based on available geological and other indirect features.
3) possess skills: use available samples of ores and host rocks to determine the genetic type of mineral deposits.

Basic search and exploration of mineral deposits
CODE - GEO429
CREDIT - 5 (2/1/0/2)
PREREQUISITES - GEO432 Structural geology

PURPOSE AND PURPOSE OF THE COURSE
Goal: formïrovanïe students with certain knowledge of the course in the region teoretïçeskïx Fundamentals poïskov, razvedkï, oprobovanïya razlïçnıx vïdov poleznıx ïskopaemıx, podsçeta zapasov and rate mestorojdenïy on razlïçnıx stadïyax geologorazvedoçnıx rabotty, a takje prïobretenïe stwdentamï navıkov ïnterpretacïï polwçennıx data, pozvolyayuşçïx efficient oswşçestvlyat poïskï and razvedkw mestorojdenïy poleznıx excavated.
Task course:
- industrial types of mineral deposits - the main objects of geological exploration;
- the main requirements of the industry to the geological-industrial assessment of mineral deposits;
- stages and stages of geological exploration work, tasks and basic requirements for the content of different stages;
- geological bases of prospecting and exploration of mineral deposits;
- Criteria of potential ore deposits of the earth's crust, geological search preconditions and search indications of mineral deposits;
- geological documentation during the search and exploration of mineral deposits;
- testing of useful fossils, tasks and types of testing, methods of sampling and methods of testing ore;
- classification of mineral reserves and forecasted mineral resources;
- basic methods of calculation of reserves of fields and assessment of forecasted resources of fossil fuels.

SHORT DESCRIPTION OF THE COURSE
Basic search tasks; geological search preconditions and indications of mineral deposits; methods of searching for useful fossils; the influence of natural conditions on the choice of search methods; rational complex of search methods. Basic tasks and principles of exploration of mineral deposits; the stage of intelligence work; intelligence systems and intelligence network density; technical means of reconnaissance; geological documentation and testing; condition stocks; calculation of reserves of mineral deposits; classification of reserves of deposits and predictable resources of fossils.

KNOWLEDGE, KNOWLEDGE, LEARNING ABOUT THE END OF THE COURSE
As a result of mastering the disciplines, students should

1) to know: geological bases of prospecting and exploration of mineral deposits; the specifics of the exploration of different types of mineral deposits; design methods and production technologies of geological exploration works; specifics of intelligence documentation; to know types and methods of testing of mineral raw materials; basic methods of calculating the reserves of useful fossil fuels; methods of organization, management of the enterprise; the state of the mineral base of the country and the prospects for its development.
2) be able to: correctly select and justify the methodology of geological exploration work in connection with geological, mining and geographical and economic features of the object of research; to conduct geological and economic evaluation of sites at different stages of geological exploration work; read graphs, diagrams, maps, diagrams, profile cuts, horizontal plans, characterizing geological structures of sites; to conduct the calculation of reserves (resources) and technical and economic analysis of geological exploration and prospecting processes.
3) master the skills: justification of methods of conducting geological exploration work; on the basis of the density of the intelligence network, the selection of rational methods of testing, the preparation of outgoing data for the calculation of stocks and the calculation of stocks by basic methods.

Mathematical Methods in Geology
CODE - GEO428
CREDIT - 5 (2/0/1/2)
PREQUISIT - Mathematics

PURPOSE AND OBJECTIVES OF THE COURSE
The purpose of teaching the discipline "Mathematical Methods in Geology" is the acquisition of theoretical knowledge by students on the basic mathematical methods used in the processing of geological-geochemical and other data obtained at different stages of geological research, the study by students of methods of mathematical modeling of the properties of geological objects and processes when solving applied and scientific tasks in different areas of geology.
Objective of the course:

BRIEF DESCRIPTION OF THE COURSE
The discipline "Mathematical Methods of Modeling in Geology" studies statistical methods of processing geological and geochemical data and patterns of distribution over an area and in space of calculated parameters, issues of object classification and pattern recognition, types of models and principles of modeling geological objects and processes, methods of constructing models based on data from various types of testing, using modern computer technology.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
After studying the discipline "Mathematical modeling methods in geology", the student must:
have an idea:
- on the principles and methods of mathematical modeling in geology;
know:
- basic mathematical methods used in geology for statistical analysis and modeling of geological objects;
- main hypotheses and criteria for their verification;
- basic principles of mathematical modeling of geological objects and processes;
- types of mathematical models and features of their application in various fields of geology;
be able to:
- to formulate geological problems in a form convenient for their solution using mathematical methods and modern computer technology;
- statistically evaluate geological objects;
- to choose the optimal schemes for processing analytical and graphic data using mathematical methods;

- choose mathematical models that most fully reflect the properties of geological objects and the type of problem being solved.

Fundamentals of subsoil use
CODE – GEO443
CREDIT – 5 (2/0/1/2)
PREREQUISITE – GEO431 General and Historical geology

GOAL AND OBJECTIVES OF THE COURSE
Course goal: The purpose of studying the discipline "Fundamentals of subsoil use" is to acquire future specialists of the geological profile of knowledge on rational subsoil use in the framework of the current legislation in the Republic of Kazakhstan.
Course objective:
- students acquire knowledge of the Laws of the Republic of Kazakhstan: "on subsoil and subsoil use", "on licensing", "on oil" , etc. , as well as Government Regulations governing subsoil use operations;
- mastering the basic principles of rational subsoil use and familiarity with departmental instructions and reporting of subsoil users;
- acquisition of skills for the practical application of the acquired knowledge when working in the specialty.

SHORT DESCRIPTION OF THE COURSE
Legal framework for subsoil use in Kazakhstan. Ownership of mineral resources, minerals and mineral raw materials. Competence of Executive bodies in the field of subsoil use. The right of subsoil use: the types and subjects of law, its origin, presentation and transmission. Procedure for granting the right to conduct exploration, production, combined exploration and production. Types, terms of validity, conclusion and execution of the contract. Work program as an integral part of the contract. Protection of mineral resources and the natural environment. Environmental basis for conducting operations on subsurface use. Safety of the population and personnel. The state Fund of mineral resources. Rights and obligations of the subsoil user. Ownership of subsurface information. Features of legal relations when conducting operations for the exploration and production of oil, groundwater, precious metals and precious stones, and other minerals. Taxation of subsoil users

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students should
1) know: main goals, objectives and principles of subsoil use in the Republic of Kazakhstan. Know all types of subsurface use operations, sources of their financing, and the system of taxation of subsurface users. Know the contents of the state subsoil Fund of the Republic of Kazakhstan.
2) be able to: draw up the necessary documents for obtaining the subsoil use right and the draft of the subsoil use Contract.
3) possess skills: conducting monitoring of subsurface use operations.

Hydrogeology with the basics of engineering geology
CODE - GEO430
CREDIT - 4 (1/0/1/2)
PREQUISIT - GE0431 General and Historical Geology

GOAL AND OBJECTIVES OF THE COURSE
Course goal: familiarization of students with fundamental and applied problems of hydrogeology, the theory, methodology and practice of hydrogeological research in the search and exploration of deposits of solid minerals, oil and gas.
Course objective: - study of conditions of occurrence, movement and formation of natural waters in the lithosphere; study of theoretical foundations of hydrogeology; study of hydrogeological aspects of environmental protection.

SHORT DESCRIPTION OF THE COURSE
Components of hydrogeology; physical properties and chemical composition of underground waters; methods of processing chemical analyses of natural waters and forms of their display; types of movement of waters and brines in the earth's crust; water solutions in the lithosphere; hydrogeological basins and geohydrodynamic systems; useful waters in the subsurface; hydrogeological surveys and studies; paleohydrogeology; hydrogeological conditions of migration, accumulation, environmental hydrogeology.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students should
1) know:
- characteristics of underground waters, their properties and their relationship to each other,
- connection to the atmosphere and underground hydrosphere,
- area of nutrition and their distribution;
- the purpose of their application.
2) be able to:
- conduct searches, exploration and evaluation of operational reserves of underground water for the purposes of water supply of settlements, agricultural and industrial enterprises;
3) possess skills:
providing a scientific basis for long-term planning of exploration, hydrogeological and other works.

Oil and gas Geology
CODE – GEO 445
CREDIT – 5 (2/0/1/2)
PREREQUISITE – GE0431 General and Historical Geology

GOAL AND OBJECTIVES OF THE COURSE
Course goal: knowledge of the basics of Geology, the structure of the earth's crust and upper sedimentary cover, rocks, the composition and physical properties of oil and gas, reservoir rocks and tires, the structure of natural reservoirs for oil, gas and water, traps, deposits and deposits of oil and gas, as well as the origin of oil and natural hydrocarbon gases.
Course objective: to acquaint students with the General laws of geological and structural development of oil and gas-bearing regions, to study the main structural elements of fields; to acquaint students with hypotheses of oil and gas formation, conditions and causes of migration of hydrocarbons of the oil range, to study oil and gas-bearing structures.

SHORT DESCRIPTION OF THE COURSE
Oil and gas Geology studies the origin, conditions of occurrence, and geological history of combustible minerals. Provides knowledge about reservoir rocks and tires, natural reservoirs for oil, gas and water, traps, deposits and deposits of oil and gas. The conditions of oil and gas formation and oil and gas accumulation, migration, concentration and conservation of hydrocarbons in traps, as well as geological and geophysical methods of searching for oil and gas are considered. On this basis, the scientific base for searching, exploration and development of oil and gas accumulations is being developed.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students should
1) know:
the main stages of geological development of oil and gas provinces, the main similarities and differences of the main structural and tectonic zones.
2) be able to:
read the legend of geological and tectonic maps of different scales, identify areas of localization of oil and gas areas; perform geometrization of oil and gas deposits;
3) possess skills:
read the legend of geological and tectonic maps of different scales, identify areas of localization of oil and gas areas; perform geometrization of oil and gas deposits

Geological mapping
CODE – GEO 440
CREDIT – 5 (2/0/1/2)
PREREQUISITE – GEO432 Structural geology

GOAL AND OBJECTIVES OF THE COURSE
Course goal: mastering techniques and methods of geological survey, as one of the main means of knowing the geological structure of the earth's crust; acquisition of skills for analyzing existing geological materials and identifying the prospects of the studied areas in relation to the discovery of minerals; familiarization with the content of General searches during geological survey; obtaining knowledge on the organization and production of geological survey works of different scales and the main requirements imposed on them; formation of skills to work with geological graphics and prepare reporting materials.
Course objective:
- getting students a solid knowledge of the theory and practice of geological survey and geological mapping;
- familiarization with special methods and features of surveying in different geological and geographical conditions and in areas of development of different origin of rocks;
- mastering the methods of facial-genetic, structural and historical-geological analysis.

SHORT DESCRIPTION OF THE COURSE
Development of methods of field Geology, geological survey and geological maps, equipment and technology of field geological research. Special methods of geological surveys in the areas of development of sedimentary, volcanic, Intrusive and metamorphic rocks. Features of shooting in different geological and geographical conditions. Analysis of the geological structure of the block of the earth's crust, preparation of geological graphics and explanatory notes to it. Methods of geological interpretation of aerial and space survey materials. Mastering the methods of facial-genetic, structural and historical-geological analysis.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students should
1) know: methods of field Geology, methods of geological survey and preparation of geological maps, techniques and technology of field geological research.
2) be able to: read geological maps, build geological sections, conduct geological surveys and make geological maps of various scales, decipher the materials of aerial and space surveys.

3) possess skills: preparation of geological maps of various scales, geological survey, analysis of available geological materials and identification of prospects for the studied areas in relation to the discovery of minerals.

Oil and gas regions of Kazakhstan
CODE - GEO 437
CREDIT - 5 (2/0/1/2)
PREQUISIT - GE0445 Petroleum Geology

PURPOSE AND OBJECTIVES OF THE COURSE
The main goal of the discipline "Oil and gas regions of Kazakhstan" is to study the geological structure of oil and gas regions of Kazakhstan, the features of the structure and formation of natural reservoirs, stratigraphic affiliation, lithology of oil and gas horizons of individual fields.

BRIEF DESCRIPTION OF THE COURSE
Discipline on the patterns of the location of oil and gas territories, the peculiarities of the distribution of oil and gas accumulations along the section and area. Regular connections of tectonic structure with features of lithogenesis and oil and gas content are considered. The formation and location of oil and gas fields are closely related to the formation conditions of oil and gas bearing sedimentary basins. The oil and gas geological zoning in Kazakhstan based on plate tectonics is given. Sedimentary basins that are promising in terms of oil and gas are considered.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
As a result of mastering the discipline, the student must have the information:
- about industrially oil and gas bearing and promising territories of Kazakhstan;
- about the structure of natural reservoirs and traps of oil and gas;
The student should be able to:
- interpret field geological and geophysical methods, GIS;
- map oil and gas traps;
- to solve standard tasks in the field of prospecting and exploration of oil and gas;
- to carry out a comparative assessment of the objects prepared for drilling in order to select the priority ones;
At the end of the course, the student should know:
- methods of obtaining and analyzing geological and geophysical information;
- types of oil and gas traps in various oil and gas regions;
- a rational set of methods for geological exploration for oil and gas in promising areas;
- ways of solving standard problems in the field of prospecting and exploration of oil and gas.

Oil and Gas Field Development I: Primary Production
CODE - PET 405
CREDIT - 5 (2/1/0/2)
PREREQUISITE - GE0445 Petroleum Geology

COURSE GOALS AND OBJECTIVES
The goal of the course is to form knowledge and ideas about the processes of filtration of oil, gas and water in rocks, as well as occurring in oil and gas deposits during their development.

BRIEF DESCRIPTION OF THE COURSE
This course covers material balance calculations for natural gas, retrograde condensate, non-volatile (black oil) and volatile (volatile oil) oil systems with and without a gas cap, and water pressure mode. Students will also learn analytical methods for predicting reservoir performance using material balance and analysis of the production drop curve.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
After completing the course, the student will:
- know the technological indicators of oil and gas field development;
- know the stages of field development and their characteristics;
- be able to assess the current state of development of oil and gas fields;
- be able to collect and summarize materials about the geological structure of oil and gas fields;
- possess the skills to develop solutions to streamline the development of oil and gas fields.
- possess the skills to prepare geological information for use as input data in the preparation of project documents.

Crystal optics
CODE – GEO 441
CREDITS – 5 (1/2/0/2)
PREREQUISITE – GEO434 Petrography

COURSE GOALS AND OBJECTIVES
The purpose of the course: crystal optics, obtaining knowledge about methods of studying rocks using a polarizing microscope and skills in drawing up petrographic descriptions.
Course objective:
- teach students the basics of crystal optics;
- instill in them practical skills of working with a polarizing microscope;
- teach students to use the main methods of crystal-optical research;
- train them to identify minerals under a microscope.

SHORT DESCRIPTION OF THE COURSE
Polarized light and polarizers; polarizing microscope; refraction and birefringence of light in minerals; related optical properties of minerals and their determination; petrographic characteristics of ultrabasic, basic, medium, acidic and foid rocks; conditions of formation and study of them using a polarizing microscope; sedimentary rocks, petrographic characteristics of clastic, clay, chemogenic and biogenic rocks, conditions of formation and study of them using a polarizing microscope; petrographic characteristics of metamorphic rocks of cataclastic contact-thermal, regional metamorphism and metasomatites and their study using a polarizing microscope.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students must
1) know:
- history, subject, tasks and methods of studying igneous, metamorphic and metasomatic rocks;
- fundamentals of crystal optics and methods of crystal-optical diagnostics of minerals, their optical constants;
- modern scientific ideas about the processes of magmatism, metamorphism and metasomatism;
- classification and main types of igneous, metamorphic, and metasomatic rocks;
- microscope device;
- the principle of constructing an optical indicatrix;
2) be able to:
- use a polarizing microscope in transmitted light;
- generalize the parameters of minerals and diagnose them under a microscope (microstructures and microtextures), various rocks.

- to reconstruct the conditions of formation of species and the primary composition of magma;
-. analyze mineral associations
- interpret the obtained data on rocks in accordance with modern classifications.

3) possess skills:
- organizational skills;
- ability to find a common language and work in a team;
- ability to make quick decisions and self-confidence.

Lithology, diagenesis and biofacies oil and gas basins
CODE – GEO 442
CREDITS – 5 (2/0/1/2)
PREREQUISITE – GEO 434 Petrography

COURSE GOALS AND OBJECTIVES
The purpose of the course: to Develop students ' knowledge and skills, develop competence in the field of composition and structure of sedimentary rocks, their geological bodies, the origin and patterns of their spatial and geochronological distribution, favorable conditions for the formation of oil and gas fields.
Course objective: to Study the classification of sedimentary rocks, types of lithogenesis, methods of lithological studies of rocks, the main stages of formation and transformation of sedimentary rocks, definition and description of the composition, structure and texture of rocks, generalization of analytical data.

SHORT DESCRIPTION OF THE COURSE
Lithology and oil and gas sedimentology is one of the main disciplines required for the specialty, studying issues affecting the material composition, structural and textural features, conditions of formation, stages of lithogenesis, sedimentation conditions and sedimentation conditions, as well as the relationship of rocks with oil and gas fields. The reasons and conditions for the occurrence of oil-containing and oil-bearing rocks, as well as the frequency of sedimentation, are studied. In addition to the theory of lithogenesis, students must acquire the skills to describe the main types of sedimentary rocks in samples and sections using a polarizing microscope and other laboratory methods

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students must
1) know:
- methodology for determining the types of sedimentary processes and conditions of sedimentation and their stratigraphic features;
- studies of the transfer and transportation of debris material;
2) be able to:
- identify features and varieties of oil and gas traps;
- types of rocks composing them, determine the conditions of sedimentogenesis;
- collector distribution systems;
3) possess skills:
- construction of litho-stratigraphic sections, paleogeographic maps,
- lithological analysis and its application in practice.

Geological and industrial types of mineral deposits
CODE – GEO 444
CREDITS – 5 (2/1/0/2)
PREREQUISITE – GE0429 Fundamentals of Prospecting and Exploration of Mineral Deposits

COURSE GOALS AND OBJECTIVES
The purpose of the course: to form students ' knowledge in the field of industrial use of various types of metal and non-metal minerals, consumer requirements for their quality and quantity, the principles of technological and industrial typing of ores, and the allocation of industrial and genetic types of minerals by types of minerals.
Course objective:
- familiarization of students with the state and prospects of development of the mineral resource base of the Republic of Kazakhstan;
- familiarization of students with industrial classifications of mineral deposits;
- study of the geological structure of deposits and morphology of ore bodies;
- study of mineral and chemical composition of ores, their application in industry;
- study of the main requirements of the industry for mineral deposits;
- introducing students to examples of industrial and genetic types of mineral deposits.

SHORT DESCRIPTION OF THE COURSE
State and prospects of development of the mineral resource base of Kazakhstan. Industrial types of deposits. Industrial classification of deposits. Basic industry requirements for mineral deposits. Industrial types of ferrous metal deposits. Industrial types of deposits of the alloying metals. Industrial types of non-ferrous metal deposits. Industrial types of precious metal deposits. Industrial types of deposits of radioactive elements. Industrial types of rare metal deposits. Industrial types of deposits of non-metallic minerals. Industrial types of fossil fuel deposits.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students must
1) know: features of the geological structure, geological and structural conditions of localization of the main types of industrial deposits of various types of metallic and non-metallic minerals.
2) be able: according to the geological and structural features, the material composition of ores and the characteristic complex of host rocks, to attribute this Deposit to a certain geological and industrial type.
3) have the skills to determine its geological and industrial type based on the existing collections of ores and host rocks, the given geological and structural features of deposits.

Geodynamics of lithospheric plates
CODE – GEO 446
CREDITS – 5 (2/1/0/2)
PREREQUISITE – GEO432 Structural Geology

COURSE GOALS AND OBJECTIVES
The purpose of the course: students learn geodynamic and tectonic processes that cause deformation of the earth's crust, understanding the processes that form various geological structures, as well as processes that lead to the distribution of heat flow in sedimentary basins and various degrees of immersion in them.
The objective of the course is to conduct practical training with students to acquire knowledge and skills that will help determine different tectonic regimes, as well as to use geo-information systems (GIS) to create geological databases and interpret remotely obtained images.

SHORT DESCRIPTION OF THE COURSE
Geodynamics studies the deep forces and processes that arise as a result of the evolution of the Earth as a planet and cause the movement of masses of matter and energy inside the Earth and in its upper solid shells. Considers the structure of the Earth, convective movements in The earth's mantle, lithospheric plates and their boundaries; the occurrence of continental rifts, their transformation into marine basins and oceans; spreading, subduction, obduction, collision situations; the evolution of sedimentary basins; geodynamic models of oil and gas formation. On this basis, the identification of hydrocarbon resources of the earth's subsurface.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students must
1) know:
Plate tectonics, plate movements, forces that move tectonic plates; distribution of compressive and tensile forces in the lithosphere, strength of the lithosphere; causes of earthquakes, and how information taken from them can be used in understanding tectonic processes;
2) be able to:
Use potential fields (gravity and magnetism) to study the earth's interior; create geological databases using GIS.
3) possess skills:
Interpretation of the deformed earth surface using remotely obtained images.

Theoretical foundations and applied aspects of GIS
CODE - GPH181
CREDIT - 5 (2/1/0/2)
PRE-REQUISIT - no

PURPOSE AND OBJECTIVES OF THE COURSE
The purpose of the course: the formation of knowledge about the physical nature and field of application of electrical, radiometric, acoustic and other geophysical methods for studying oil and ore wells.

BRIEF DESCRIPTION OF THE COURSE
The basics of integrating geophysical research methods for specific types of fields are given. The technique and technique of GIS, technical conditions for carrying out GIS, principles and methodology of integration are described. Methods for studying the technical condition of wells and methods for monitoring field development are considered. As part of the course, the student will master the theoretical foundations and applied aspects of geophysical methods for well survey (GIS) in prospecting and exploration of mineral deposits, the physical essence of GIS methods, principles of work, types of equipment currently used for applications of methods for geophysical research of wells. Basic knowledge and skills in the field of geophysics, geology, petrophysics, physics, as well as well survey methods in prospecting and exploration of mineral deposits will be presented.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
As a result of mastering the discipline, students should be able to:
- read GIS diagrams
- evaluate the filtration properties of rocks
- be able to determine the boundaries and thickness of ore bodies
- be able to process GIS diagrams, etc.
At the end of the course, the student should know:
- petrophysics of rocks;
- classification of GIS methods and the principle of operation;
- physical foundations of GIS;
- modern GIS equipment;
- the principle of integrating well logging methods, etc.

Geophysical survey of wells of uranium deposits
CODE - GPH180
CREDIT - 5 (2/1/0/2)
PREQUISIT - GE0411 Geophysical methods of prospecting and exploration

PURPOSE AND OBJECTIVES OF THE COURSE
The purpose of the course: is to study the increase in the geological efficiency of geophysical work in uranium deposits of the infiltration type.

BRIEF DESCRIPTION OF THE COURSE
This discipline forms knowledge about the physical nature and field of application of well logging methods (GIS) in prospecting and exploration of uranium deposits. Highlights the role of GIS in solving geological problems - lithological and stratigraphic dissection of well sections, allocation of uranium deposits and determination of their physical properties and cross-well correlation. Explains the geochemical and nuclear-physical properties of uranium, petrophysical models of uranium deposits of the main industrial types, geophysical research methods in wells during the exploration and development of uranium deposits by the method of underground borehole leaching.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
As a result of mastering the discipline, students should be able to:
- - read GIS diagrams
- - evaluate the filtration properties of rocks
- - be able to determine the boundaries and thickness of ore bodies
- - be able to interpret diagrams of GK, KS, PS, IK, TC, TM, INKL, etc.
- - know the principle of calculating stem reserves
At the end of the course, the student should know:
- - petrophysical models of uranium deposits and conditions for their localization;
- - modification of geophysical studies in wells during exploration and development of uranium deposits;
- - geophysical support of the method of underground borehole leaching of uranium
- - the method of lithological dissection of rocks and correlation of sections
- - methodology for assessing the filtration properties of rocks
- - methodology for assessing radioactive equilibrium in uranium ores
- - a method for determining the boundaries and thickness of ore bodies.

Modern geophysical technologies for calculating the reserves of uranium deposits
CODE - GPH182
CREDIT - 5 (2/1/0/2)
PREQUISIT - GE0411 Geophysical methods of prospecting and exploration

PURPOSE AND OBJECTIVES OF THE COURSE
The purpose of the course: t the practical use of well logging data, processing and interpretation of geophysical data from uranium deposits, as well as the skills of lithological dissection of the section along the wellbore and make an estimate of reserves.

BRIEF DESCRIPTION OF THE COURSE
This discipline instills skills in the use of personal computers and software technologies when processing logging data and the possibility of using logging results when mining and mining uranium by in-situ leaching.
The discipline covers the general methodological provisions for calculating the reserves of ore deposits and the specifics of calculating the reserves of uranium deposits, the features of the choice of conditional indicators, the principles of delineating ore deposits, and the calculation of average parameters.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
As a result of mastering the discipline, students should be able to:
- - read GIS diagrams
- - evaluate the filtration properties of rocks
- - be able to determine the boundaries and thickness of ore bodies
- - be able to interpret the diagrams of GK, KS, PS, IK, TC, TM, INKL, etc.
At the end of the course, the student should know:
- - petrophysical properties of coal and uranium deposits and the conditions for their localization;
- modification of geophysical studies in wells during exploration and development
- ore deposits;
- the method of lithological dismemberment of rocks and correlation of sections
- methodology for assessing the filtration properties of rocks
- methodology for determining the boundaries and thickness of ore bodies.

Mining engineering
CODE – MIN502
CREDIT - 5 (2/1/0/2)
Prerequisite – no

Course Objective:
Mastering mining terminology, mastering the principles of mining operations in open, underground and borehole mining of mineral deposits, basic concepts of mineral processing
The objective of the course: obtaining in-depth knowledge about the current state, the main directions and prospects of development of the mining industries, terminology and production technology in the underground method of development.

SHORT DESCRIPTION OF THE COURSE
Prospects for the development of underground mining of mineral deposits. Mining and geological characteristics of mineral deposits. Sizes and elements of occurrence of ore deposits. Basic information about mining during underground mining. Key indicators of ore extraction. Losses and dilution of ore. Concepts about the mine field, mine. Stages of development of mine fields. Opening of ore deposits. Autopsy requirements. The opening workings of ore deposits. Opening with vertical, inclined trunks, combined methods of opening. The main production processes of the treatment excavation. The concept and classification of ore development systems. Requirements for them. Open space systems. The choice of an underground mining system.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
As a result of mastering the discipline, students should

1) know: the relative position in space of all mine workings, which is a prerequisite for the creative study of opening and preparation of mine fields, development systems for various mining and geological and mining conditions of deposits.
2) be able to: assess the geological and mining conditions of mining operations, have an initial understanding of how to develop mineral deposits.
3) have the skills to: calculate the main processes, apply the main and auxiliary processes depending on the geological and mining conditions of the deposit, choose rational methods of opening and preparation of ore deposits.

Computer technologies in Geology
CODE-GEO 451
CREDIT – 5 (1/2/0/2)
PREREQUISITE- GE0429 Fundamentals of Prospecting and Exploration of Mineral Deposits

COURSE GOALS AND OBJECTIVES

The purpose of the course: to provide theoretical and practical knowledge in the field of computer technology in relation to the problems of Geology.
Course objective:
-provide theoretical and practical knowledge in the field of computer technology in relation to the problems of Geology;
-development of preliminary knowledge about the basic concepts of construction
-geological maps, sections, stratigraphic columns, etc.;
-deepening technological education in the field of computer technology;
-getting General ideas about the use of a computer in Geology;
-developing practical skills in modern Geology.

SHORT DESCRIPTION OF THE COURSE

Creation of geological maps in the geological industry, which are qualitatively more advanced cartographic models that reflect modern knowledge about the geological structure of individual blocks of the earth's crust and are the fundamental geological basis for creating all types of specialized maps of geological content. The discipline "Computer technologies in Geology" allows students to acquire knowledge about the methods of digital mapping and spatial reference; ability to work in design programs for drawing stratigraphic columns and diagrams that do not require spatial reference; skills in drawing digital maps of various contents and purposes; competently work with MapInfo, CorelDraw programs.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE

As a result of mastering the discipline, students must
1) know: methods of drawing up and digitizing graphical geological material and spatial references of geological maps.
2) be able: be able to work competently with a variety of geological graphics in computer execution in various modern computer technologies (ArcGIS, MapInfo, Coreldraw).
3) have the skills to draw up and digitize graphic geological material and spatial reference of geological maps.

Oil and gas provinces of the world
CODE-GEO 447
CREDIT – 5 (2/0/1/2)
PREREQUISITE-GEO445 Oil and Gas Geology

COURSE GOALS AND OBJECTIVES

The purpose of the course: Generalization and analysis of comprehensive geological and field information about oil and gas fields and deposits in the initial state and in the process of development for the geological and technical justification of the most effective development systems and maximum extraction of oil and gas from the subsurface.
Course objective:
- The course "oil and Gas provinces of the world" is the most important profile discipline that determines the professional training of mining engineers-geologists in the specialty "Geology of oil and gas".
- Using the example of specific oil and gas-bearing territories of the world, students study the main features of the distribution of oil and gas accumulations by section and area within the geostructural elements of various types, thereby establishing natural connections between the specifics of tectonic and lithogenesis, as well as the nature of the oil and gas content of individual regions.

SHORT DESCRIPTION OF THE COURSE
According to the discipline oil and gas provinces of the world, the problems of oil and gas geological zoning are solved. Oil and gas-bearing provinces, ancient and young platforms are singled out. Volga-Ural, Timan-Pechora, Caspian, Central Kazakhstan, Dnieper-Pripyat, Baltic, Lena-Vilyuy, Lena-Tunguska NGP, oil and gas provinces of young platforms, West Siberian, pre-Caucasian-Crimean (Scythian) NGP and Turan GNP, oil and gas provinces of folded and transitional territories, Transcaucasian, West Turkmen, far Eastern, pre-Ural, pre-Carpathian NGP. oil and gas provinces of foreign countries. NGP of North and South America, Middle and Middle East.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students must
1) know:
- features of development of oil, gas and gas condensate deposits;
- geological and commercial justification for the allocation of operational objects and floors;
- geological and technological factors.
2) be able to:

- to build and analyze structural maps, estimation plans, geological and geophysical profiles, correlation diagrams, maps the thermal, reservoir pressure
- analyze the geological and field characteristics of productive horizons, operational objects and development floors;

3) possess skills:

analysis of geological and geophysical information, geological maintenance of all geological operations when drilling reference, parametric, search and exploration wells.

Applied geochemical research
CODE-GEO 457
CREDIT – 5 (2/0/1/2)
PREREQUISITE - GE0429 Fundamentals of prospecting and exploration of mineral deposits

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COURSE GOALS AND OBJECTIVES
The purpose of the course: to familiarize students with and understand the theoretical foundations of geochemical methods, on the basis of which the most rational method of searching and detecting mineral deposits can be selected and applied depending on specific geological and landscape-geochemical conditions, as well as to acquire practical skills in interpreting and processing geochemical data.
Course objective:
- formation of students ' ideas about the geochemical bases of searches, geochemical search signs of deposits and methods of geochemical search operations;
- mastering methods for assessing migration conditions and concentration of chemical elements, identifying geochemical barriers;
- the study of the geochemical classifications of the chemical elements according to various criteria;
- mastering methods of isotope Geochemistry;
- analysis of geochemical maps using GIS technologies;
- mastering the technique of geochemical searches in various landscape and climatic zones;
- carrying out calculation of geochemical resources of the subsoil areas.

SHORT DESCRIPTION OF THE COURSE
Geochemical methods for prospecting for mineral deposits are based on the study of the distribution patterns of elements and their compounds found in natural conditions. Easy-to-discover deposits have been discovered, so the prospects for opening new objects are associated with the Fund of "hard-to-discover deposits", which include deposits: overlaid with loose deposits; primary and secondary minerals of ores, whose ore bodies are visually indistinguishable from the host rocks. The detection of these types of deposits is made by geochemical methods of search.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students must
4) know:
– theoretical basis of geochemical methods of prospecting of MPI,
- forms of finding elements in the earth's crust,
- General concepts of geochemical anomalies,
– basic patterns of migration of elements in the earth's crust,

- internal and external factors of element migration,
- General regularities of formation of secondary lithochemical scattering halos, their parameters,
- types of geochemical methods for searching for mineral deposits

5) be able to:

– based on the theoretical foundations of geochemical methods, it selects the most rational search method for detecting deposits of solid minerals depending on specific geological and landscape-geochemical conditions.

6) possess skills:

- students will acquire skills of working in a team when discussing the work plan for the sections of the course program, during the preparation and public protection of materials in the form of reports and presentations,
- learn the rules of active and constructive listening, openness, and feedback.
- interpretation of geochemical data.

Geochemical methods of prospecting for mineral deposits
CODE - GEO 453
CREDIT - 5 (2/0/1/2)
PREREQUISIT - GE0429 Fundamentals of prospecting and exploration of mineral deposits

PURPOSE AND OBJECTIVES OF THE COURSE
The objectives of mastering the discipline "Geochemical methods of prospecting" is to familiarize with the geochemical methods of prospecting for mineral deposits, which play an important role at all stages of the exploration process. The discipline involves the study of the possibilities of geochemical methods and the sequence of their implementation.

BRIEF DESCRIPTION OF THE COURSE
Theoretical foundations of geochemical prospecting methods. Classification of geochemical prospecting methods

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
Upon completion of the course, the student must demonstrate the ability to analyze:
- internal and external factors of migration of elements,
- general patterns of formation of primary and secondary lithochemical dispersion halos,
- and also be able to calculate the scattering halos of elements in the earth's crust.
Based on the research data, the most rational method for prospecting and discovering mineral deposits can be selected.
The student should be able to: based on the theoretical foundations of geochemical methods, he selects the most rational prospecting method for discovering solid mineral deposits, depending on specific geological and landscape-geochemical conditions.
At the end of the course, the student should know:
- forms of finding elements in the earth's crust;
- assimilation of the main factors of migration of elements;
- geochemical methods of prospecting for mineral deposits.

Theoretical bases of oil and gas field prospecting and exploration
CODE-GEO 456
CREDIT – 5 (2/0/1/2)
PREREQUISITE-GEO445 Oil and Gas Geology

COURSE GOALS AND OBJECTIVES
The aim of the course: to master the theoretical foundations of predicting the petroleum potential of mineral resources, petroleum geological zonation of oil and gas formation and accumulation; to learn the geological background of the formation and publication of regional oil and gas complex.
Course objective:
- study and generalize the structure and stages of oil and gas exploration;
- to study the geological prerequisites for the formation and placement of regional oil and gas complexes.

SHORT DESCRIPTION OF THE COURSE
Theoretical bases of methods of search and exploration of hydrocarbon deposits (oil, gas, and condensate), as well as the main complex of geological and geophysical research during prospecting and exploration are considered.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students must
1) know:
- basics of forecasting oil and gas potential;
- oil and gas geological zoning.
2) be able to:
- analyze and summarize geological and geophysical data, tabular data, and graphic materials: maps, diagrams, and log charts;
to give a preliminary assessment of the hydrocarbon potential of the;
3) possess skills:
analysis, interpretation and generalization of geological and geophysical information.

Laboratory methods of mineral research
CODE-GEO 452
CREDIT – 5 (1/2/0/2)
PREREQUISITE-GEO 434 Petrography

COURSE GOALS AND OBJECTIVES
The purpose of the course: to Gain students ' knowledge on microscopic study of ores of various genetic types of deposits. To master the theory and practice of microscopic investigation of ores. Teach students the skills of self-diagnosis of ore-forming minerals in reflected light and the ability to use the definition tables, which can be used to determine the mineral under the microscope. To impart basic techniques in the study of textural and structural analysis, paragenetic mineral associations, and mineral typomorphism. Introduce modern methods of mineralogical research, which open up great opportunities in solving genetic and applied problems.

Course objective:
- determination of the mineral composition of ores and finding out the regularities of its change in different parts of the ore body;
- study of the typomorphism of the main ore-forming minerals;
- study of distribution patterns and determination of the dimension of valuable components in ores and main ore minerals;
- identification of different types of ores and their constituent paragenetic mineral associations, their placement in the field;
- characteristics of the structure (texture and structure) of the ore;
- finding out the sequence of mineral formation

SHORT DESCRIPTION OF THE COURSE
Special discipline on methods of diagnostics of mineral substances, studies of the physical and chemical composition of ores, their structural and textural and other features that determine their quality and affect the technology of extraction and processing. Ore microscopy, spectral and x-ray structural analysis, thermal analysis, petrophysical methods, study of gas-liquid inclusions, cryometry, decrepitation, concentrate method: their capabilities and requirements for sample quality. Applications of these methods in practical Geology and methodology.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students must
1) know:
- diagnostic properties of ore-forming minerals in reflected light
- the principle of defining tables,
- textures and structures of ores,

- paragenetic mineral associations,
- typomorphism of minerals.

2) be able to:

- determine ore minerals by diagnostic properties and determination tables using a microscope;
- analyze structural and textural features of ore structure and paragenetic associations;

– on the basis of the studied ore composition and structure, be able to restore the Genesis and order of ore formation.

3) possess skills:

comprehensive mineralogical studies, which resolved due to genetic and applied problems.

Geodynamics of oil and gas basins
CODE - GEO 481
CREDIT - 5 (2/0/1/2)
PREQUISIT - GE0445 Petroleum Geology

PURPOSE AND OBJECTIVES OF THE COURSE
The main purpose of studying the discipline "Geodynamics of oil and gas basins" is the consideration of models of processes occurring in the crust and mantle of the Earth; familiarization with the methods of modern geodynamics; familiarization with the models of the formation of sedimentary basins of various types.
Objective of the course:
the student must have basic knowledge of the subsidence patterns of the earth's crust, the structure, geodynamic settings of the formation and evolution of sedimentary basins; knowledge and the relationship of the structure of sedimentary basins.

BRIEF DESCRIPTION OF THE COURSE
Methods for describing tectonic processes occurring in the surface shells of the Earth. Thermal convection. Convection in the Earth's mantle. Connection of movements in the mantle and in the asthenosphere. Driving forces of plate tectonics. Using data from global seismic tomography. Geodynamics of sedimentary basins. Classification of sedimentary basins and their internal structure. Dive curves. Mathematical theory of paleotectonic analysis. The main processes that can be associated with the formation of sedimentary basins. Classification principles and types of sedimentary basins.
Stresses in the lithosphere. Features of stress distribution in the lithosphere.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
As a result of mastering the discipline, students should be able to:
- to determine and use the possibilities of applied geodynamics in solving specific geological and practical problems of identifying, prospecting and evaluating oil and gas fields,
- to process field and analytical material, use empirical and theoretical diagrams and models of typical environments for the formation of structural-material complexes in the construction of tectonic maps for predictive assessment of territories.
At the end of the course, the student should know: the basic provisions, principles and physical foundations of the theory of "Tectonics of lithospheric plates" and models of the formation of sedimentary basins, modern terminology and methodology of the concepts of "Geodynamics of oil and gas basins",
- knowledge of the geodynamic settings of the formation of structural-material complexes in the earth's crust.

Physics of oil reservoir
CODE-GEO 448
CREDIT – 5 (2/0/1/2)
PREREQUISITE-Physics

COURSE GOALS AND OBJECTIVES
The aim of the course is to provide students with the theoretical and experimental scientific foundations necessary for understanding and regulating the physical processes that occur in reservoirs during the construction of wells and during fluid filtration.
Course objective: to prepare students for independent analysis of the physical properties of reservoirs and fluids, physical processes occurring in the reservoir when filtering fluids to justify and optimize the technology of exploitation of oil and gas fields.

SHORT DESCRIPTION OF THE COURSE
Preparation of the field for operation, which is based on knowledge of sedimentary rocks, reservoirs, oil and gas and their physical properties, as well as the specific surface of rocks, carbonate rocks, porosity, permeability, laws of motion in the reservoir of a mixture of oil, water and gas, natural regimes of deposits, mechanical and thermal properties, electrical and radioactive properties of rocks. Physical and chemical properties of oil, gas, and reservoir waters are considered. The issues of application of methods for increasing oil recovery and methods of impact on the bottom-hole zone of wells are solved.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students must
1) know:
- main production processes that represent a single chain of oil and gas technologies;
- basic properties of petroleum hydrocarbons, hypotheses of organic and inorganic origin of oil and gas, principles of classification of oils and gases, properties and patterns of behavior of dispersed systems;
- principles of using the physical properties of the reservoir for solving engineering problems of the oil and gas profile;
2) be able to:
- determine the value of the physical and parametric properties of the reservoir and reservoir fluids;
- methods for studying the physical, chemical and mechanical properties of rocks in air and in contact with various liquids;
- know the characteristics of the main physical properties of reservoir rocks and interpret the data of geophysical surveys of wells
3) possess skills:
analysis of classification principles for oil and gas systems.

The basics of geotectonics
CODE - GEO 455
CREDIT - 5 (2/0/1/2)
Prerequisite - GEO 432 Structural Geology

GOAL AND OBJECTIVES OF THE COURSE
The purpose of the course: students to acquire knowledge on the structural features and development of tectonic structures of various ranks; the deep structure of the Earth and the evolution of the structure of lithospheric plates; the study of causal relationships of tectonic processes occurring in the bowels of the planet, with the structure of the earth's crust and upper mantle.
Course objective: study of the causes, features of manifestation, course of action tectonic movements in the context of the upper hard shells of the Earth - in the earth's crust and lithospheric mantle, as well as the identification of the time and sequence of the laying, development and stabilization of tectonic structures of the earth's crust of various ranks (structural elements of the earth's crust) formed as a result of tectonic stresses and in various tectonic modes.

SHORT DESCRIPTION OF THE COURSE
A branch of geology that studies the structure, movements and deformation of the lithosphere, and its development in connection with the development of the Earth as a whole. Geodynamics is a new scientific discipline that establishes and explores the forces that generate processes that change the composition and structure of the shells of solid Earth. Its main method is modeling: mathematical and physical. Geotectonics in solving the most common issues - the causes of tectonic movements, deformations and the development of the structure of the lithosphere as a whole, is interfaced with geodynamics, since it is the latter that studies forces acting on a global scale.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
As a result of mastering the discipline, students should
1) know:
- tectonic terminology; causes and patterns of tectonic movements;
- methods of geotectonics (structural analysis, comparative geotectonics, power analysis, analysis of breaks and disagreements, volume analysis, paleotectonic analysis, the study of modern and neotectonic movements, physical and mathematical modeling and others);
- methods and specifics of studying tectonic movements of the geological past and modern;
- the concept of tectonics of lithospheric plates and other hypotheses of the formation of the Earth as a whole and the crust in particular;
- the era of mountain building and tectogenesis in the history of the Earth;

- cyclical tectonic processes;
- tectonic criteria for prospecting for mineral deposits;

2) be able to:

- compile various types of tectonic maps and profiles, other models of tectonic structures, including 3 and 4D models;
- determine the relative age of tectonic disturbances;
- determine the amplitude and direction of tectonic movements, the time of their manifestation and the duration of the movements;
- determine the tectonic criteria for forecasting mineral deposits

3) own skills:

- use of the principles of tectonic zoning;
- application of geotectonic research methods.

Geological basis for the development and operation of oil and gas fields
CODE - GEO 450
CREDIT - 5 (2/0/1/2)
Prerequisite - GEO 445 Oil and Gas Geology

GOAL AND OBJECTIVES OF THE COURSE
The purpose of the course: to give complete information about the object of research, in search of patterns that combine the observed disparate facts about the structure and functioning of the reservoir into a single whole, in developing rules for the rational conduct of research, in creating methods for processing, generalizing and analyzing the results of observations and studies, in evaluating the effectiveness these methods in various geological conditions for a rational system for the development of oil and gas fields.
Course Objective:
- master the geological foundations of the design of the development of oil deposits;
- to study the regimes of exploitation of deposits and associated oil recovery.

SHORT DESCRIPTION OF THE COURSE
Development, testing of wells, geological and field and hydrodynamic studies. Trial operation. The main provisions and objectives of the development. Commissioning of oil and gas fields. Allocation of operational facilities, development floors. The system of development of oil fields, geological control of oil recovery in the development process. Geological factors. Technological factors. Development stages. Rational development system. Development pace analysis. New methods of stimulation for enhanced oil recovery.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
As a result of mastering the discipline, students should
1) know:
-methods of researching wells and reservoirs;
- reservoir properties of rocks;
2) be able to:
- determine well operation modes;
- conduct an analysis of field development;
3) own skills:
obtaining processing, analysis and generalization of geological, geophysical and technical information.

Geological assessment of mineral resources and reserves
CODE - GEO 184
CREDIT - 5 (2/0/1/2)
REQUISITES - GEO429 Fundamentals of Prospecting and Exploration of Mineral Deposits

GOAL AND OBJECTIVES OF THE COURSE

The purpose of the course: teaching students how to correctly assess mineral deposits, including the assessment of geological factors (quantity, quality, technological properties of minerals, mining and geological conditions of mining and geographic and economic location of deposits).
Course Objective:
- students' mastery of the theory, methods and technology of geological support for the evaluation of mineral deposits at the selected stages of exploration (prospecting and assessment; exploration and development);
- the formation of the necessary practical skills for students, according to geological and economic assessment, mineral deposits.

SHORT DESCRIPTION OF THE COURSE

Fundamentals of research and use (geological and economic assessment) of subsoil in the Republic of Kazakhstan. Laws and normative legal acts of the Republic of Kazakhstan - guidance materials on the geological and economic assessment of MPI. Stages and stages of exploration. Criteria of industrial value MPI. Intelligence Methods. Assessment of the variability of mineral properties. Technical means of geological study in the evaluation and exploration of mineral deposits. Classification of mineral reserves. Conditions for mineral raw materials and their impact on reserves and quality. Appointment of condition. Calculation of stocks of solid minerals. Examination of geological materials. Comparison of exploration data with the results of field exploitation.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE

As a result of mastering the discipline, students should

1) know:
2) - methods for calculating mineral reserves,
3) - The theoretical basis of the geological and economic assessment of MPI,
4) - tasks of geological and economic assessment of mineral resources;
5) - determination of the quantity and quality of mineral raw materials, its location, conditions of occurrence and production, technical and economic development indicators

2) be able to:

6) - develop the principles of geological and economic assessment;
7) - use acquired knowledge in theoretical and practical situations;
8) - to analyze the economic indicators of operations on subsurface use, their financing and prospects for the development of the geological industry in the Republic of Kazakhstan.
9) 3) own skills:
10) analysis and generalization of stock and published geological materials on the geological structure and methods of exploration of mineral deposits;
11) contouring and blocking mineral reserves in the bowels;
12) compilation of the geological part of the feasibility study of the industrial significance of solid mineral deposits;
13) the application of techniques for calculating the reserves of steeply dipping and sloping ore bodies.

Geological and economic assessment of mineral deposits
CODE - GEO 454
CREDIT - 5 (2/0/1/2)
PREREQUISIT - GE0429 Fundamentals of prospecting and exploration of mineral deposits

PURPOSE AND OBJECTIVES OF THE COURSE
The purpose of the discipline: teaching students how to correctly assess mineral deposits, including the assessment of geological factors (quantity, quality, technological properties of minerals, mining and geological conditions of development and the geographic and economic position of deposits), as well as the fundamental features of mining based on mining rents, mineral markets and other contemporary economic indicators.

BRIEF DESCRIPTION OF THE COURSE
Introduction. Basics of research and use (geological and economic assessment) of subsoil in the Republic of Kazakhstan. Laws and regulations of the Republic of Kazakhstan - guidelines for geological and economic assessment of mineral deposits. Stages and stages of geological exploration. Criteria for the industrial value of mineral deposits. Intelligence methods. Assessment of the variability of properties of minerals. Technical means of geological study in the assessment and exploration of mineral deposits. Classification of mineral reserves. Conditions for mineral raw materials and their impact on reserves and quality. Appointment of conditions. Calculation of reserves of solid minerals. Examination of geological materials. Comparison of exploration data with the results of field exploitation.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
Expected results: students mastering the theory, methods and technology of geological support for the assessment of mineral deposits at the selected stages of geological exploration (prospecting and assessment; exploration and development); the formation of students the necessary practical skills in the areas determined by the main goal of the course.

Oilfield geology and reserves estimation
CODE - GEO 449
CREDIT - 5 (2/0/1/2)
Prerequisite - GEO 445 Oil and Gas Geology

GOAL AND OBJECTIVES OF THE COURSE
The purpose of the course: Compilation and analysis of comprehensive geological and field information on oil and gas fields and deposits in the initial state.
Course Objective:
In the process of development for the geological and technical substantiation of the most effective development systems and the maximum extraction of oil and gas from the bowels.

SHORT DESCRIPTION OF THE COURSE
To carry out geological maintenance of all geological operations when drilling wells at all stages of the geological exploration process for oil and gas, to predict the prospects of territories in oil and gas bearing.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
As a result of mastering the discipline, students should
1) know:
- Features of the development of oil, gas and gas condensate deposits;
- geological and field justification for the allocation of operational facilities and floors;
2) be able to:
- analyze the features of the development of oil, gas and gas condensate deposits;
- draw up a geological and field justification for the allocation of production facilities and floors;
3) own skills:
geological maintenance of all geological operations during drilling at all stages of the exploration process for oil and gas.

Mining geology
CODE - GEO 458
CREDIT - 5 (2/1/0/2)
REQUISITES - GE0429 Fundamentals of Prospecting and Exploration of Mineral Deposits

GOAL AND OBJECTIVES OF THE COURSE
Course goal: To teach knowledge, skills, and decision-making in geological support and in the provision of exploration and mining.
Course Objective:
comprehensive geological study of the exploited field and its individual parts and blocks for the correct solution of all mining and geological issues related to technically correct and appropriate development of the field with the most complete and comprehensive use of mineral resources and to extend the life of mining enterprises due to the increase in additional reserves.

SHORT DESCRIPTION OF THE COURSE
The subject of the study of mine geology is prepared for industrial development and exploited mineral deposits. Within the mining allotments of mines of mines and quarries, operational exploration of deposits is carried out with the aim of providing mining enterprises with explored mineral reserves. During operational exploration and development of deposits, geological documentation and mineral testing will be performed. During the exploitation of deposits, the movement of reserves, losses and dilution of minerals is counted and accounted for, and exploration and exploitation data are compared.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
As a result of mastering the discipline, students should
1) know:
– - the main methods and methods of geological support and support of exploration and mining operations in the design, construction and development of solid mineral deposits;
– - the basics of geological documentation, testing of mining and exploration workings and natural outcrops of rocks and ores;
– - The main methods for calculating the reserves of various types of solid minerals;
– - drawing up a balance of stocks and reporting on the fulfillment of license-contract conditions;
2) be able to:
- carry out work on calculating the reserves of solid minerals in blocks, horizons, sections, grades;

- allocate to calculate industrial reserves: open, prepared for production and ready for production and their rationing;
- draw up state reporting on stocks, according to the conditions for fulfilling licensed-contractual conditions.

3) own skills: teamwork skills; organization of geological work during mining operations.

Organic geochemistry of oil and gas basins
CODE –GEO459
CREDIT – 5 (2/0/1/2)
PREREQUISITE – GEO445 General geology

GOAL AND OBJECTIVES OF THE COURSE
Course goal: the goal is to master the basics of the theory of formation of oil and gas deposits, the factors that control their composition and location, as well as the applied use of geochemical knowledge in the search, exploration, development of fields, collection and preparation, transportation and processing of oil
Course objective:
study of the transformation of the composition, concentrations and distribution patterns of organic matter (S), starting from the original biochemical compounds of living matter, their transformation into fossil S and its further transformation at various stages of lithogenesis (sedimentogenesis, diagenesis, catagenesis, hypergenesis).

SHORT DESCRIPTION OF THE COURSE
Considers aspects of the development of the doctrine of the formation of the composition of fossil fuels and methods of their study. The process of oil and gas formation. Natural bodies where the processes of oil and gas generation take place (or have taken place) are oil and gas master suites, each stage of life of which corresponds to a certain composition of OV and products of its transformation (oil, gas). The composition, concentration, and degree of transformation of OW are the basis for quantitative and qualitative assessment of geological hydrocarbon resources using organic Geochemistry and mathematical modeling.

KNOWLEDGE AND SKILLS AT THE END OF THE COURSE
As a result of mastering the discipline, students should
1) know:
– composition, properties of oils and their relationship to the quality and price of oil;
– main geochemical methods for searching for oil and gas fields, their tasks and content at the regional and search stage;
– types and forms of oil and gas migration in rocks, driving forces of migration;
2) be able to:
– understand the principles of geochemical oil and gas exploration;
– see the prospects for opening new fields
3) possess skills:
– general theoretical knowledge about the Geochemistry of oil and gas as a science that studies the geological history of the formation of combustible minerals, the formation of deposits, the impact on their composition and location of natural physical and chemical processes;

– methods of laboratory research of caustobiolites and scattered organic matter of rocks
– methods of statistical analysis of geochemical data for solving problems of oil and gas prospecting Geology;
– bitumen, atmo-, litho - and biogeochemical methods of prospecting of mineral deposits.

Geomorphology and geology of anthropogenic
CODE - GEO 461
CREDIT - 5 (2/0/1/2)
Prerequisite - GEO 431 General and Historical Geology

GOAL AND OBJECTIVES OF THE COURSE
The purpose of the course: is to familiarize students with the topography of the Earth in relation to its morphology, genesis, age and development, as well as understanding the relationship between the modern and buried topography with loose deposits, knowledge of the features of the Quaternary deposits, their genetic and stratigraphic classifications, methods of study and mapping.
Course Objective:
- gaining knowledge on the classification of relief and the role of relief-forming factors in its origin;
- the assimilation of techniques and methods for a comprehensive study of the terrain, the identification of geomorphological complexes, their relationships among themselves, the geological structure and loose deposits;
- familiarization with the main features of geomorphology and geology of the Quaternary sediments of Kazakhstan;
- the acquisition of techniques and methods for compiling geomorphological maps and maps of Quaternary sediments, their analysis with a forecast of further development of the relief and localization of minerals.

SHORT DESCRIPTION OF THE COURSE
Geomorphology is a science that studies the shape of the earth's surface (topography) in relation to their general appearance, size, origin (genesis) and age. The formation of the relief is due to many variables: conditions, factors and processes that develop in time and space. The most pronounced relief formation manifested itself in Neogene-Quaternary time, the so-called neotectonic stage of the Earth’s development, which is studied by the geology of anthropogenous. The close connection and interdependence of relief forms, continental deposits and the conditions in which they are formed, determines the need to consider these issues simultaneously in one course. Knowledge of the laws and features of the formation of the relief makes it possible to carry out a forecast and search for minerals.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
As a result of mastering the discipline, students should
1) know:
- classification of the relief and the role of relief-forming factors in its origin;

- methods for a comprehensive study of the relief, the identification of geomorphological complexes, their relationships among themselves, the geological structure and loose deposits;

2) be able to:

- make structural-geomorphological analysis of landforms;
- using knowledge of the basics of neotectonics, describe the staged development of the relief;
- compile geomorphological maps, profiles, columns of Quaternary sediments, correlate them and draw up elementary maps of Quaternary sediments;
- describe the contents of medium-scale geomorphological maps and geological maps of Quaternary sediments;
- decrypt the terrain on aerial photographs and topographic maps.

1) own skills:

- conducting a comprehensive analysis of natural landforms,
- construction of geological and topographic profiles and presentation of work results in text and graphical form; geological sections and topographic profiles; geomorphological maps and profiles;
- studies of natural landforms.

Computer simulation of oil and gas fields
CODE - GEO 461
CREDIT - 5 (2/0/1/2)
Prerequisite - GEO 445 Oil and Gas Geology

GOAL AND OBJECTIVES OF THE COURSE
The purpose of the course: to provide initial training for students by specifying knowledge in the field of informatization of petroleum geology.
Course Objective:
the acquisition by students of the necessary knowledge about the principles of creating geological models; gaining skills in solving practical and theoretical problems of creating three-dimensional computer models; the formation of skills for the optimal and rational use of modern technologies for the interpretation and preparation of the source of fishing information and its use in creating 3D models; application of acquired knowledge, skills and abilities in subsequent professional activities; teach students to choose a software shell in accordance with the task; the study of special methods of computer design; studying the features of specialized programs.

SHORT DESCRIPTION OF THE COURSE
Types and technology for constructing geological models. Dimension of models. Comparative characteristics of full-scale and operational geological models. The composition of the primary data for building the model. Methods for checking the completeness and reliability of the source data and simulation results. The technology of constructing a structural model. Facies model building technology. Mechanical and hydrodynamic properties of porous media and formation fluids. Two-phase flow of liquids in the oil-water reservoir.
KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE
As a result of mastering the discipline, students should
1) know:
stages of constructing constantly operating geological and technological models; theoretical foundations of algorithms for calculating the geological and filtration model; methods of computer mapping; composition and capabilities of various software products used in the oil industry for geological and filtration modeling.
2) be able to:
analyze the geological and field database for completeness and reliability, build a structural framework, construct a structural map for the roof and bottom of the formation and layers, maps of total thickness, maps of distributed geological and geophysical parameters of the formation; substantiate the oil-water contact in the model; Own computerized inventory method.
3) own skills:

the ability to download data to calculate the filtration model, adapt the model according to the development history, do development analysis based on the received field distribution maps

Defense of thesis / graduation project
CODE - ECA102
CREDIT – 4

The purpose of the thesis (project) is:
1) systematization, consolidation and expansion of theoretical knowledge and practical skills in the specialty and their application in solving specific scientific, technical, economic and production problems, as well as cultural tasks;
2) the development of independent work skills and mastery of the methodology of scientific research and experimentation in solving developed problems and issues;
3) elucidation of the student's preparedness for independent work in the conditions of modern production, science, technology, culture, as well as the level of his professional competence.

SHORT DESCRIPTION
The procedure for the defense of the thesis (project) is determined by the Rules for conducting current control of academic performance, intermediate and final state certification of students in educational institutions, approved by orders of the Ministry of Education and Science of the Republic of Kazakhstan. The defense of the thesis (project) is carried out at an open meeting of the state certification commission with the participation of at least half of its members. The defense of the thesis (project) is organized in a public form, with the presence of students, teachers of the graduating department. A scientific adviser, representatives of the organization, on the basis of which a diploma study and other interested parties can be invited, can also be invited to defense. The duration of the defense of one thesis, as a rule, should not exceed 30 minutes per student. To protect the thesis, the student makes a report to the state certification commission and those present no more than 15 minutes. Everyone present in the form of questions or speeches can participate in the discussion of the thesis (project). After discussion, the secretary of the commission reads a review (in case of presence, the supervisor can speak in person) and a review. If there are comments in the recall and / or review, the student should give a reasoned explanation of their nature. Based on the results of the defense of the thesis (project), an assessment is made according to a point-rating letter system. In this case, the level of theoretical, scientific and practical training, the opinion of the supervisor and the reviewer's rating are taken into account. The results of the defense of the thesis are documented by the minutes of the meeting of the state certification commission individually for each student and announced on the day of the defense.

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