

**NJSC “Kazakh National Research Technical University named after
K.I.Satpaev»
Institute of Geology and Oil and Gas K.Turysova
Department of "Geological Survey, Prospecting and Exploration of Mineral
Deposits"**

EDUCATIONAL PROGRAM

**"GEOLOGY AND EXPLORATION OF SOLID MINERAL RESOURCES"
profile direction (1.5 years)**

**Master of Engineering and Technology in the educational program " 7M07218
Geology and exploration of solid mineral deposits"**

1st edition
in accordance with the State Educational Standard of Higher Education 2018

The program is drawn up and signed by the parties:

From KazNITU named after K. Satpaev :

1. Head of the Department of the SSPiRMPI
2. Director of IGNGD them. K.Turysova
3. Chairman of the UMG department, professor



А.А. Бекботаева
А.Х. Сыздықов
А.Б. Байбатша

From employers:

1. Chief researcher of the Institute of Geological Sciences named after K.I. Satpaev , Candidate of Geological and Mineralogical Sciences Zhunusov A.A.
2. Director of ICC GEO LLP, full member of PONEN - Kabaziyev B.M.
3. Head of the exploration site Pustynnoye JSC "AK Altynalmas ", Candidate of Geological and Mineralogical Sciences Rassadkin V.V.

From the partner university:

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

Approved at a meeting of the Academic Council of the Kazakh National Research Technical University named after K.I. Satpaeva . Minutes No. 3 dated 06/25/2021

Qualification:

Level 7 of the National Qualifications Framework:

7M07 Engineering, manufacturing and construction industries

7M072 Manufacturing and processing industries (master):

Geology and exploration of solid mineral deposits

Professional competence: Management of the geological industry, organization, conduct and control of geological exploration at all stages and stages of geological research, be an expert in geology and exploration of subsoil, the state and prospects for the development of the industry, the legislative framework for subsoil use, as well as requirements for the quality of mineral raw materials and market conditions global, regional and local markets.

Brief description of the program:

Designed for the implementation of profile training of masters in the educational program "Geology and exploration of solid mineral deposits" in Satbayev University and developed within the framework of the direction " Industrial and manufacturing industries ".

1. *The purpose of the educational program of the master's program "Geology and exploration of deposits of solid minerals"* is to prepare, taking into account the prospects for the development of the country, competitive highly qualified personnel with high spiritual and moral qualities, capable of independent thinking and ensuring progressive scientific, technical, socio-economic and cultural development of society .

At the master's level, training in the specialty "Geology and Exploration of Solid Mineral Deposits" is carried out along a trajectory that involves the implementation of educational programs for the training of personnel in the geological sector with in-depth technical, analytical, production, managerial and forecasting training.

2. *Types of labor activity:*

- production;
- design;
- organizational and managerial.

Master in Geology and Exploration of Solid Mineral Deposits, depending on the type of professional activity, is prepared to solve the following professional tasks:

a. *production activity:*

- independent preparation and conduct of production field, laboratory and interpretation studies in solving practical problems;
- independent selection, preparation and professional operation of modern field and laboratory equipment and instruments;
- collection, analysis and systematization of available specialized information using modern information technologies;
- complex processing and interpretation of field and laboratory information in order to solve production problems;
- determination of the economic efficiency of production work;

б. *project activity:*

- design and implementation of production and technical projects;
- participation in the examination of projects of production and technical work;
- participation in the development of regulatory methodological documents in the field of geological work;

в. *organizational and managerial activities:*

- planning and organization of production and technical field, laboratory and interpretation work;
- planning and organization of production and technical seminars and conferences.

3. *Objects of professional activity of the graduate:*

- earth, earth's crust, lithosphere, rocks, deposits of solid minerals;
 - physical properties of rocks;
 - minerals, crystals, geochemical fields and processes;
 - geological environment, natural and man-made geological processes;
- ecological functions of the lithosphere.

PASSPORT OF THE EDUCATIONAL PROGRAM

1 Scope and content of the program

The term of study in the magistracy is determined by the amount of mastered academic credits. Upon mastering the established amount of academic credits and achieving the expected learning outcomes for obtaining a master's degree, the educational program of the master's program is considered to be fully mastered. In the specialized master's program there are 92 academic credits with a study period of 1.5 years.

Planning the content of education, the method of organizing and conducting the educational process is carried out by the university and the scientific organization independently on the basis of credit technology of education.

The master's program in the profile direction implements educational programs of postgraduate education for the training of managerial personnel with in-depth professional training.

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

- 1) theoretical education, including the study of cycles of basic and major disciplines;
- 2) practical training of undergraduates: various types of practices, scientific or professional internships;
- 3) experimental research work, including the implementation of a master's project - for a specialized master's program;
- 4) final certification.

The content of the EP "Geology and Exploration of Solid Mineral Deposits" based on the development of a multi-level system of training, fundamentality and quality of education, continuity and succession of education and science, unity of education, upbringing, research and innovation, aimed at maximum satisfaction of consumer needs, should ensure:

- obtaining a full-fledged and high-quality professional education in the field of geology of solid mineral deposits (SMT), confirmed by the level of knowledge and skills, skills and competencies, their assessment, both in content and in volume
- ensuring the training of masters for 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 resources;
 - a high level of theoretical training in the field of socio-cultural, economic, legal and professional disciplines, taking into account the trends of modern professional social development, the inclusion in the educational process of leading domestic and foreign specialists in the service sector in geology;
 - high level of language training;

- development of skills in design and production activities, implementation of projects aimed at the practical application of modern professional digital methods and technologies for organizing the activities of geological production enterprises;
- the optimal ratio in the educational process of theoretical and practical training (due to the purposeful organization of experimental research and production practices);
- personality-oriented approach to the educational process, focused on developing a responsible attitude to the results of their professional activities;
- aspect of self-development, where the emphasis is on the organization of professional activities, within which the undergraduate is focused on continuous professional self-improvement.

Objectives of the educational program:

- The readiness of specialists for project work in the field of prospecting, exploration, and exploitation of solid mineral deposits.
- The readiness of specialists for production and technological activities that ensure the introduction and operation of new geological technologies at the local level.
- The readiness of specialists to search for and receive new information necessary to solve professional problems in the field of knowledge integration in relation to their field of activity, to actively participate in the activities of an enterprise or organization.
- The readiness of specialists for information and problematic communications in a professional environment and in an audience of non-specialists with a clear and deep justification of their position, to engage in organizational, managerial and service activities, to be aware of the responsibility for making their professional decisions.
- The readiness of specialists for self-learning and continuous professional development throughout the entire period of scientific or professional activity.

2 Entry requirements

The previous level of education of applicants is higher professional education (bachelor's degree). The applicant must have a diploma of the established form and confirm the level of knowledge of the English language with a certificate or diplomas of the established form.

The procedure for admission of citizens to the magistracy is established in accordance with the "Model Rules for Admission to Education in Educational Organizations Implementing Educational Programs of Postgraduate Education".

The formation of a contingent of undergraduates is carried out by placing a state educational order for the training of scientific and pedagogical personnel, as well as paying for education at the expense of citizens' own funds and other sources. The state provides citizens of the Republic of Kazakhstan with the right to receive free postgraduate education on a competitive basis in accordance with the state educational order, if they receive education at this level for the first time.

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

In the absence of the necessary prerequisites, the undergraduate is allowed to master them on a paid basis.

3 Requirements for completing studies and obtaining a diploma

Awarded degree / qualifications : The graduate of this educational program is awarded the academic degree "Master of Engineering and Technology " in the direction of "Industrial and Processing Industries" in the specialty "Geology and Exploration of Solid Mineral Deposits".

A graduate who has mastered master's programs should have the following general professional competencies:

- the ability to independently acquire, comprehend, structure and use new knowledge and skills in professional activities, develop their innovative abilities;
- the ability to independently formulate research goals, establish a sequence for solving professional problems;
- the ability to put into practice the knowledge of fundamental and applied sections of the disciplines that determine the direction (profile) of the master's program;
- the ability to professionally choose and creatively use modern scientific and technical equipment to solve scientific and practical problems;
- the ability to critically analyze, present, defend, discuss and disseminate the results of their professional activities;
- possession of skills in the preparation and execution of scientific and technical documentation, scientific reports, reviews, reports and articles;
- willingness to lead a team in the field of their professional activity, tolerantly perceiving social, ethnic, confessional and cultural differences;
- readiness for communication in oral and written forms in a foreign language to solve the problems of professional activity.

A graduate who has mastered the master's program must have professional competencies corresponding to the types of professional activities that the master's program is focused on:

production activity:

- the ability to independently carry out production, field and laboratory and interpretation work in solving practical problems;
- the ability to professionally operate modern field and laboratory equipment and instruments in the field of the mastered master's program;
- the ability to use modern methods of processing and interpreting complex information to solve production problems;

project activity:

- the ability to independently draw up and present projects of research and development work;

- readiness to design complex research and scientific and production works in solving professional problems;
- *organizational and managerial activities*:
- readiness to use practical skills in organizing and managing research and development work in solving professional problems;
- readiness for the practical use of regulatory documents in the planning and organization of scientific and production work;

When developing a master's program, all general cultural and general professional competencies, as well as professional competencies related to those types of professional activities that the master's program is focused on, are included in the set of required results for mastering the master's program.

4.1. Study period 1.5 years



APPROVED
Regent Board
K. Sathayev
M. Begentaev
2022 y.

Educational program 7M07218 - "Geology and exploration of solid mineral deposits"
Group of educational programs M121 - "Geology"

Form of study: full-time		Duration of study: 1,5 year			Academic degree: master of engineering and technology					
Discipline code	Name of disciplines	Cycle	Total amount in credits	Total hours	Classroom amount lec/lab/pr	SES (including TSIS) in hours	Form of control	Allocation of face-to-face training based on courses and semesters		
								I course		2 course
								1 semester	2 semester	3 semester
CYCLE OF BASIC DISCIPLINES (BD)										
M-1. Module of basic training (university component)										
LNG212	Foreign language (professional)	BD UC	2	60	0/0/2	30	E	2		
MNG726	Management	BD UC	2	60	1/0/1	30	E	2		
HUM211	Management Psychology	BD UC	2	60	1/0/1	30	E	2		
M-2. Basic geological training module (component of choice)										
GEO753	Petrogenetic minerals	BD CCH	4	120	2/0/1	75	E	4		
GEO754	Actual problems of geology				2/0/1					
GEO763	Basin analysis & Sedimentary Geology				2/0/1					
GEO209	Geological modeling of mineral deposits	BD CCH	5	150	2/0/1	105	E	5		
GEO767	Genesis of the main industrial deposits				2/0/1					
GEO764	Technology of underground borehole ore leaching				2/0/1					
CYCLE OF PROFILE DISCIPLINES (PD)										
M-3. Module of professional geological training (university component)										
GEO220	Metallogeny and ore formations of Kazakhstan	PD UC	5	150	2/0/1	105	E	5		
GEO210	Geological support of subsoil use	PD UC	5	150	2/0/1	105	E	5		
component of choice										
GEO709	Geotectonics with geodynamics basics	PD CCH	5	150	2/0/1	105	E		5	
GEO227	Mineralogy of radioactive and rare earth elements				2/0/1					
GEO231	Basics of petrology	PD CCH	5	150	2/0/1	105	E		5	
GEO758	Petrochemistry				2/0/1					
GEO232	Fundamentals of technology of strategic metals				2/0/1					
GEO214	Advanced well logging	PD CCH	5	150	1/0/2	105	E		5	
GPE211	GIS uranium deposits				2/1/0					
GEO223	Methods of lithological research	PD CCH	5	150	2/0/1	105	E		5	
GEO208	The geological structure of ore fields and deposits				2/0/1					
GEO734	Design of hydrogeological and geotechnological wells				2/0/1					
GEO240	Regional geology of the UIC	PD CCH	5	150	2/0/1	105	E		5	
GEO212	Geochemistry of radioactive elements				2/0/1					
GEO246	Ecological geology	PD CCH	5	150	2/0/1	105	E	5		
GEO283	Actual problems of stratigraphy				2/0/1					
GEO285	Data Mining				2/0/1					
M-4. Practice-oriented module										
AAP253	Production practice	PD UC	5						5	
AAP208	Production practice	PD UC	4							4
M-5. Experimental research module										

AAP249	Experimental research work of a master's student, including internship and implementation of a master's project	ERWM UC	18							18
M-6. Module of final attestation										
ECA213	Registration and protection of the master's project (RaPMP)	FA	8							8
Total based on UNIVERSITY:										
										30
										30
										60
										30

Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			
			university component (UC)	component of choice (UCH)	Total
BD	Cycle of basic disciplines		6	9	15
PD	Cycle of profile disciplines		19	30	49
	Total for theoretical training:	6	25	39	64
	ERWM				18
FA	Final attestation	8			8
	TOTAL:	8	25	39	90

Decision of the Academic Council of KazNRTU named after K.Satbayev, Protocol № 3, "27" october 2022 y.

Decision of the Educational and Methodological Council of KazNRTU named after K.Satbayev, Protocol № 2, "21" october 2022 y.

Decision of the Academic Council of the Institute, Protocol № 1, "14" 10 2022 y.

Vice-Rector for Academic Affairs

Director of the Institute of Geology and Oil and Gas Business

Head of the Department of "Geological survey, search and exploration of mineral deposits"

Representative of the Council from employers

B. Zhanitkov

A. Syadykov

A. Belkhotayeva

A. Zhumusev

5 Descriptors for the level and scope of knowledge, skills, abilities and competencies

The requirements for the level of preparation of a master's student are determined on the basis of the Dublin descriptors of the second level of higher education (master's) and reflect the acquired competencies, expressed in the achieved learning outcomes.

Learning outcomes are formulated both at the level of the entire educational program of the master's program, and at the level of individual modules or academic discipline.

Descriptors reflect the learning outcomes that characterize the student's abilities:

1) demonstrate developing knowledge and understanding of geology, prospecting and exploration of solid minerals, based on advanced knowledge of this field, in the development and (or) application of ideas in the context of research;

2) apply at a professional level their knowledge, understanding and abilities to solve problems in a new environment, in a broader interdisciplinary context;

3) to collect and interpret information for the formation of judgments, taking into account social, ethical and scientific considerations;

4) clearly and unambiguously communicate information, ideas, conclusions, problems and solutions, both to specialists and non-specialists;

5) learning skills necessary for independent continuation of further education in the studied field of geology.

6 Competencies upon completion of training

6.1 Requirements for key competencies of graduates of a *specialized master's program*, must:

1) *have an idea:*

- about modern trends in the development of scientific knowledge;
- about actual methodological and philosophical problems of natural (social, humanitarian, economic) sciences;

- about the contradictions and socio-economic consequences of globalization processes;

- on the current state of the economic, political, legal, cultural and technological environment of the global business partnership;

- on the organization of strategic enterprise management, innovation management, leadership theories;

- about the main financial and economic problems of the functioning of enterprises.

2) *know:*

- methodology of scientific knowledge;
- the main driving forces for changing the structure of the economy;
- features and rules of investment cooperation;
- at least one foreign language at a professional level, allowing for scientific research and practical activities.



3) be able to:

- apply scientific methods of cognition in professional activities;
- critically analyze existing concepts, theories and approaches to the study of processes and phenomena;
- integrate knowledge gained within different disciplines, use it to solve analytical and managerial problems in new unfamiliar conditions;
- conduct a microeconomic analysis of the economic activity of the enterprise and use its results in enterprise management;
- put into practice new approaches to the organization of marketing and management;
- make decisions in complex and non-standard situations in the field of organization and management of the economic activity of an enterprise (firm);
- apply in practice the norms of the legislation of the Republic of Kazakhstan in the field of regulation of economic relations;
- think creatively and be creative in solving new problems and situations;
- carry out information-analytical and information-bibliographic work with the involvement of modern information technologies;
- summarize the results of experimental research and analytical work in the form of a master's thesis, article, report, analytical note, etc.

4) have skills:

- solving standard scientific and professional problems;
- scientific analysis and solution of practical problems in the organization and management of economic activities of organizations and enterprises;
- research problems in the field of management and marketing and use the results to improve enterprise management methods;
- professional communication and intercultural communication;
- oratory, the correct and logical formulation of their thoughts in oral and written form;
- expanding and deepening the knowledge necessary for everyday professional activities and continuing education in doctoral studies;
- use of information and computer technologies in the field of professional activity.

5) be competent:

- in the field of research methodology in the specialty;
- in the field of modern problems of the world economy and the participation of national economies in world economic processes;
- in the organization and management of the enterprise;
- in the implementation of industrial relations with various organizations, including public service bodies;
- in ways to ensure constant updating of knowledge, expansion of professional skills and abilities.

Competencies acquired by students during the development of the educational program "Geology and exploration of solid mineral deposits"

Basic competencies (B)	
B1	Ability for abstract thinking, analysis, synthesis; willingness to act in non-standard situations, to bear social and ethical responsibility for the decisions made; readiness for self-development, self-realization, use of creative potential; the ability to use in-depth knowledge of legal and ethical standards in assessing the consequences of one's professional activities, developing and implementing socially significant projects and using in practice the skills and abilities in organizing production work, in managing a production team
B2	Possess the ability for active social mobility; readiness to lead a team in the field of their professional activity, tolerantly perceiving social, ethnic, confessional and cultural differences
B3	The ability to apply modern computer technologies in the collection, storage, processing, analysis and transmission of geographic information and to solve production and technological problems of professional activity; own methods for assessing the representativeness of the material, sample size in quantitative studies, statistical methods for comparing the data obtained and determining patterns
B4	The ability to freely use the state language and a foreign language as a means of business communication; the ability to actively communicate in scientific, industrial and social-public spheres of activity; readiness for independent production and technical work
Professional competencies (PC)	
PC1	The ability to formulate problems, tasks and methods of professional research, to obtain new reliable facts based on observations, experiments, analysis of empirical data, to compile analytical reviews of accumulated information in world science and production activities, to generalize the results obtained in the context of previously accumulated knowledge in science and to formulate conclusions and practical recommendations based on representative and original research results
PC2	The ability to creatively use in production and technological activities the knowledge of fundamental and applied sections of special disciplines of the master's program. Ability to use modern methods of processing and interpreting geological information in conducting and production studies
PC3	Own the basics of design, expert-analytical activities and research using modern approaches, methods, equipment and computer systems. The ability to develop projects for geological exploration, geological prospecting, geological appraisal work and organize such work
PC4	They will understand the features of metallogeny, minerageny , industrial types of deposits in the regions of Kazakhstan. They will be able to analyze the structural scheme of formations of various ages; draw up a metallogenic map according to the type of mineral; analyze metallogenic maps. They will know about the patterns of formation and crystallization of magmatic melts, modern classification and nomenclature, chemical and mineral composition, structure and genesis of the main types and varieties of magmatites .
PC5	Will understand modern methods and materials of Earth remote sensing and photogrammetry; physical foundations of remote sensing of the Earth; technology and methods of image enhancement. They will be able to select and use remote sensing data in combination with other initial data for solving various applied problems; perform processing of aerospace images using special software; correctly choose and justify the required resolution of images; apply various ways to improve the image and extract the necessary information from it in geological mapping and prospecting; perform generalization and analysis of the information received; own the main methods, ways and means of obtaining, storing, processing information; work with spatial data in geographic information systems

PC6	<p>They will understand and know the regional structures of the earth's crust of the studied territory in four positions: the principle of tectonic zoning of regional structures; boundaries of each considered structure; know the features of the geological structure of the structure in terms of its stratigraphy and tectonics (development history); highlight minerals structure. Learn to analyze a tectonic map and a map of tectonic zoning. They will be able to independently conduct an analysis, compare the geological data of one territory with another, reproduce the history of the geological development of the region and highlight the structures and associated types of mineral deposits.</p>
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6.2 Requirements for the experimental research work of a master student in a specialized master's program:

- 1) corresponds to the profile of the educational program of the master's program, according to which the master's project is carried out and defended;
- 2) is based on modern achievements in science, technology and production and contains specific practical recommendations, independent solutions to management problems;
- 3) is performed using advanced information technologies;
- 4) contains experimental and research (methodological, practical) sections on the main protected provisions.

6.3 Requirements for the organization of practices:

The educational program of the specialized master's program includes an internship in the PD cycle.

Industrial practice in the PD cycle is carried out in order to consolidate the theoretical knowledge gained in the learning process, acquire practical skills, competencies and professional experience in the master's educational program being trained, as well as mastering best practices.

ECTS Diploma Supplement

The application was developed according to the standards of the European Commission, the Council of Europe and UNESCO/SEPES. This document serves only for academic recognition and is not an official confirmation of a document of education. Not valid without a high school diploma. The purpose of completing the European Annex is to provide sufficient data on the holder of the diploma, the qualification 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 on the national education system. The application model on which grades will be translated uses the European Credit Transfer or Transfer System (ECTS).

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

English (professional)

CODE - LNG 212

CREDIT - 2 (0/0/1/1)

PREREQUISITE – Academic English, Business English, IELTS 5.0-5.5

PURPOSE AND OBJECTIVES OF THE COURSE

The aim of the course is to develop students' English language proficiency for their current academic studies and to improve their performance in the field of project management.

BRIEF DESCRIPTION OF THE COURSE

The course aims to build vocabulary and grammar for effective project management communication and improve reading, writing, listening and speaking skills at the Intermediate level. Students are expected to develop their Business English vocabulary and learn grammatical structures that are often used in management contexts. The course consists of 6 modules. The 3rd module of the course ends with an intermediate test, and the 6th module is followed by a test at the end of the course. The course ends with a final exam. Undergraduates also need to study independently (MIS). MIS - independent work of undergraduates under the guidance of a teacher.

KNOWLEDGE, SKILLS AFTER COMPLETING THE COURSE

Upon successful completion of the course, students are expected to be able to recognize the main idea and the main message, as well as specific details when listening to monologues, dialogues and group discussions in the context of business and management; understand written and oral speech in English on topics related to management; write management texts (reports, letters, emails, minutes of meetings) following a common structure with a higher degree of grammatical accuracy and using business words and phrases, talk about various business situations using appropriate business vocabulary and grammatical structures - in pairs and groups discussions, meetings and negotiations.

Management

THE CODE – MNG 726

CREDIT – 2 (1/0/0 /1)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the discipline "Management" is to master the methodology of project management in various fields of activity, to cultivate a culture adequate to modern project management and information technology, to create conditions for the introduction of new information technologies in the field of project implementation. The course is based on international recommendations for project management (Project management Body of knowledge).

BRIEF DESCRIPTION OF THE COURSE

The content of the discipline is aimed at studying modern concepts, methods, tools of project management in order to apply them in the further practical activities of a specialist to solve the problems of planning and executing projects.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know:

modern standards in the field of project management and their characteristics; PMI approach to project management; planning of investment activity; accounting for project risks; methods for optimizing the use of available resources; ways to resolve conflict situations; analysis of actual indicators for timely adjustment of the progress of work.

Be able to:

prepare documents of the project initialization stage , such as a feasibility study, project charter, develop and analyze documents related to the planning of project activities, apply various decision support methods; promptly control the execution of work and track deadlines; select personnel, resolve conflicts between team members; manage the risks arising from the implementation of projects.

Have skills:

Project software in the process of project management

Management psychology

CODE - HUM 211

CREDIT - 2 (1/0/0/1)

PRE-REQUISITE - no

PURPOSE AND OBJECTIVES OF THE COURSE

teaching undergraduates the basics of higher education psychology, expanding their professional capabilities in terms of applying psychological knowledge in the field of pedagogical activity.

BRIEF DESCRIPTION OF THE COURSE

Psychological education at the university. The psychological structure of the learning process, the psychology of cognitive activity, psychological methods and means to improve the efficiency and quality of education in modern conditions, the psychology of the individual and the student team, the upbringing and development of professional self-awareness, psychodiagnostics in higher education, the psychological characteristics of the pedagogical activity of a higher school teacher who is studying as a subject educational activity, psychological and pedagogical communication, psychology of pedagogical influence, basic psychological problems in pedagogical activity.

KNOWLEDGE, SKILLS AFTER COMPLETING THE COURSE

At the end of the course, the undergraduate must master the basic knowledge, skills and abilities about the socio-psychological nature of pedagogical activity, about the properties of mental and cognitive processes included in cognitive activity, about the content and specifics of the psychological and pedagogical impact, about the individual characteristics of the objects of influence of the ability, be able to use the necessary psychological and methodological resources for the preparation and conduct of classes (lectures, seminars, SIWT and exams); be able to apply adequate psychodiagnostic methods for studying the personality of a student and a student group; manage the learning process, on various aspects of communication in the field of professional activity, professional reflection, mastery of the main methods of psychological influence.

Petrogenic minerals

THE CODE – GEO 753

CREDIT – 4 (2/0/1/1)

PRE-REQUISITE: GEO122 Petrography

PURPOSE AND OBJECTIVES OF THE COURSE

is to give undergraduates knowledge about the patterns of propagation of light waves in a crystalline medium and to teach the ability to identify rock-forming minerals using a polarizing microscope.

BRIEF DESCRIPTION OF THE COURSE

Refraction of light in minerals and associated optical effects observed with a microscope; birefringence and optical indicatrix of minerals of various syngonies and related optical properties of minerals; path of light in a polarizing microscope; conoscopic method for determining the optical axis, sign and angle of the optical axes of minerals; immersion method for determining the refractive indices of minerals; study and determination by optical properties of petrogenic minerals of igneous, sedimentary, metamorphic and metasomatic rocks using a polarizing microscope.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

To know: as a result of studying this discipline, undergraduates will gain knowledge about the patterns of propagation, refraction, birefringence and interference of light waves in a crystalline medium and related optical constants of minerals

Be able to: use a polarizing microscope, Fedorov's table.

Have skills: research and determination of petrogenic minerals using a polarizing microscope.

Actual problems of geology

THE CODE - GEO 754

CREDIT – 4 (2/0/1/1)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

Familiarization of undergraduates in the geological specialty with the main problems of modern geological science so that they know these problems, try to solve them, or at least take into account and skillfully orient themselves in solving theoretical and practical issues of geology during their work.

BRIEF DESCRIPTION OF THE COURSE

C structure and composition of the Earth, a number of contradictions that arise when the metallic composition of the inner and outer core of the Earth is assumed; the main sources of internal heat of the Earth; basic provisions of lithospheric plate tectonics; the essence of thermal convection in the asthenosphere as the driving force of mobile lithospheric plates

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know: the basic terms and concepts of the course, master the basic patterns of development of the earth's lithosphere due to the energy and matter of the underlying layers of the planet, primarily the asthenosphere.

To be able to: determine the causes, manifestation features, directions of action of tectonic movements (stresses) in the section of the upper solid shells of the Earth - in the earth's crust and in the lithospheric mantle, identify the time and sequence of initiation, 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 regimes.

Have skills: analysis of cause-and-effect relationships of the occurrence of endogenous activity of the Earth, features of the manifestation of tectonic stresses in the tectonosphere (in sections of the earth's crust, lithospheric mantle and asthenosphere as a whole), assumptions of their role in the formation of tectonic structures of various ranks.

Basin analysis and Sedimentary geology

THE CODE - GEO 763

CREDIT – 4 (2/0/1/1)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

discipline is focused on the study and analysis of the structure, composition and evolution of the formation of sedimentary basins and the patterns of sedimentary ore formation on continents and oceans in the history of the Earth. This course is also focused on developing the skills of independent research activities of students.

The aim of the course is to provide a basic knowledge of the various models and geodynamic settings for the formation of sedimentary basins and associated mineral deposits from the early Precambrian to the present.

BRIEF DESCRIPTION OF THE COURSE

The course is intended for students of the EP "Geology and Exploration of Mineral Deposits". This course discusses various models of subsidence of the earth's crust, geodynamic causes and conditions for the formation of sedimentary basins, which provide both the generation and industrial accumulations of hydrocarbon raw materials, and the formation of other types of sedimentary mineral deposits. The basics, regularities and stages of lithogenesis, the history of sedimentation in various settings and further post-sedimentary transformations of sedimentary rocks (hypergenesis , sedimentogenesis, diagenesis, catagenesis , metagenesis) and related mineral deposits are also studied, both by types of lithogenesis (humid , arid, volcanogenic-sedimentary), and by facies types (lagoonal, lacustrine, oceanic). The characteristics of the main types of sedimentary mineral deposits are given: mechanical, chemogenic, biochemical and deposits of combustible minerals.

Theoretical development of the course will be carried out on the basis of lectures, laboratory classes, as well as self-study of basic and additional literature. The course will provide the student with a basic knowledge of the various models and geodynamic settings for the formation of sedimentary basins and associated mineral deposits from the Early Precambrian to the present. The course "Analysis of basins and sedimentary geology" is closely related to the disciplines of the geological cycle, passed earlier.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know :

- the most important processes that determine the formation of various types of sedimentary basins;
- general patterns and types of lithogenesis of sedimentary basins;
- analyze, generalize and systematize data on a specific sedimentary basin and formulate appropriate conclusions;

Designed by:	Considered: meeting of the Board of the Institute	Approved by: UMS KazNITU	Page 21 of 44
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- classification, composition and distribution of sedimentary rocks;

You should : characterize sedimentary strata, highlighting lithological, genetic and facies types of sediments; to determine the causes, features of manifestation, directions of action of tectonic movements (stresses) in the section of the upper solid shells of the Earth - in the earth's crust and in the lithospheric mantle, to identify the time and sequence of initiation, 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 regimes.

Have skills: analysis of cause-and-effect relationships of the occurrence of endogenous activity of the Earth, features of the manifestation of tectonic stresses in the tectonosphere (in sections of the earth's crust, lithospheric mantle and asthenosphere as a whole), assumptions of their role in the formation of tectonic structures of various ranks.

Geological modeling of mineral deposits

THE CODE – GEO 209

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of studying this discipline is to gain knowledge, skills and abilities to work with software for three-dimensional geological modeling and assessment of mineral reserves. To give theoretical and practical knowledge in the field of computer modeling of deposits: in relation to the tasks of geology. Deepening technological education in the field of computer technology.

BRIEF DESCRIPTION OF THE COURSE

Introduction. The emergence of the need for computer programs for the visualization and interpretation of various geological exploration data in a 3D environment. Three-dimensional modeling of mineral deposits. Working with graphic applications. Field modeling and reserves estimation using Micromine software.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know: methods and basic principles of geological modeling of mineral deposits in relation to problems solved in geology;

Be able to: on the basis of primary geological materials to interpret and create wireframe, block models of ore bodies; build digital surface models (DSM); visualize interpreted geological, geochemical, etc.

Have skills: apply GIS technologies to solve geological and appraisal works mineral; estimate ore reserves using various methods of the Micromine program.

Genesis of the main industrial deposits

THE CODE - GEO 485

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

The aim of the course is to study the theory of formation of deposits of various types of minerals and the proposed models of formation. Objectives of the discipline: acquaintance with the existing ideas about the conditions for the formation of minerals; study of individual atypical forms of ore deposits; mastering the main provisions of the theory of magmatism, metallogeny and ore formation; study of the mechanism of formation of magmatic deposits; study of the mechanism of formation of metamorphic deposits; theory of formation of groundwater and oil and gas fields.

BRIEF DESCRIPTION OF THE COURSE

Pyrite deposits of the world, pyrite-bearing provinces, ore regions and nodes, typical deposits. Classification of genetic types: Cypriot, Ural, Brazilian type, theory of their formation. Features of the formation of gold deposits in Kazakhstan. Spatial-temporal paragenetic connection of uranium and gold deposits, models of their formation. Deposits of uranium, iron ore, copper deposits of Kazakhstan, their world analogues and the theory of their formation.

KNOWLEDGE, SKILLS AFTER COMPLETING THE COURSE

Know: industrial types of mineral deposits: iron, copper, gold, silver, lead, zinc and others. The theory of the formation of sulfide, stratiform, hydrothermal, and other deposits.

able to: analyze the geological position of the deposit and ore occurrence, highlight the structures of ore fields and bodies, draw up the order of mineral formation and recreate the tectonic - stratigraphic conditions for the formation of the deposit.

Have the skills to analyze the geological, tectonic map, stratigraphic column, on the basis of a comprehensive analysis, be able to recreate and describe the genesis of industrial types of deposits.

Technology of underground borehole ore leaching

THE CODE - GEO 764

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

This discipline forms knowledge about the physical nature and scope of methods of geophysical well surveys (GIS) in the search and exploration of ore deposits .

BRIEF DESCRIPTION OF THE COURSE

In-situ borehole leaching (ISL) is a process of processing ores in natural conditions in ore bodies, exposed by technological wells and prepared for leaching. During the production process, solutions are injected through injection wells and the dissolved mineral is removed through extraction wells. It highlights the role of well logging in solving geological problems - lithological and stratigraphic subdivision of well sections, identifying uranium deposits and determining their physical properties and inter-well correlation. It outlines the geochemical and nuclear-physical properties of uranium, petrophysical models of uranium deposits of the main industrial types, geophysical methods of research in wells during the exploration and development of uranium deposits by the method of underground borehole leaching .

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

As part of the course, the student will master the practical use of well logging data, processing and interpretation of geophysical data for calculating borehole uranium reserves, as well as for lithological dissection of the section along the wellbore.

Basic knowledge and skills in the field of geophysics, geology, petrophysics , physics, as well as well survey methods in the search and exploration of uranium deposits will be presented. Upon completion of the course, the student must demonstrate the ability to read, process and interpret geophysical data, as well as build a well passport.

Metallogeny and ore formations of Kazakhstan

THE CODE – GEO 220

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course is to study the main provisions of general metallogeny and familiarize with the content of regional, historical, special metallogeny for the development of the geological foundations of the mining business, as the fundamental principles for the development of the mineral industry.

The main tasks of studying the discipline are to master the terminology and conceptual base of metallogenic science and the doctrine of ore formations, the principles of metallogenic and ore-formational analysis; get acquainted with the most important types of ore formations and elements of the metallogeny of oceans, platforms and folded systems from the point of view of lithospheric plate tectonics; have an idea about the metallogenic zoning of the world, the CIS and Kazakhstan

BRIEF DESCRIPTION OF THE COURSE

The concept of metallogeny and minerageny. General metallogeny. The concept of ore-forming processes and systems. The concept of ore formation analysis. Formations are geological, ore, metasomatic and metallogenic. General principles of metallogenic research. Metallogeny of modern seas and oceans, folded geosynclinal belts. Fundamentals of metallogeny from the standpoint of modern geodynamics. Metallogeny of rift settings, subduction-orogenic settings, precious metals, non-metallic, ferrous, non-ferrous, radioactive, rare metals of Kazakhstan.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know: features of metallogeny and minerageny in the regions of Kazakhstan.

To be able to: analyze the structural scheme of formations of different age; draw up a metallogenic map according to the type of mineral; analyze metallogenic maps.

Have Skills: Comparison of Typical Ore and Geological Formations of Kazakhstan compilation and analysis of geological and genetic models of typical ore formations of Kazakhstan: iron ore, gold ore, copper ore.

Geological support of subsoil use

THE CODE – GEO 210

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is to familiarize with the problems of interaction between man and the geological space, patterns and forecast of anthropogenic changes in the geological environment, rational subsoil use and nature protection, legislative and regulatory documents.

BRIEF DESCRIPTION OF THE COURSE

Technogenic processes at mining facilities are described that lead to pollution of rocks, air, water, disruption of the stability of the subsoil and landscape change, the methodology for choosing a rational mining technology, information on waste disposal during the extraction of minerals and life products. A qualitative and quantitative environmental and economic assessment of the development of deposits and the necessary environmental measures, an assessment of the impact of mining on the environment is presented. An environmental analysis of the development of new deposits is given.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

must know:

- understand and have theoretical knowledge about the ecological functions of the lithosphere and the impact of man-made activities on the geological space

should be able to:

- assess the impact of mining on the elements of the geological environment;

must own:

- to foresee the causes influencing the consequences of the impact of technogenesis on natural geological environments.

Geotectonics with the geodynamics basics

THE CODE – GEO 709

CREDIT - 5 (2/0/1/2)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

Determination of the causes, features of manifestation, direction of action of tectonic movements in the section of the upper solid shells of the Earth - in the earth's crust and lithospheric mantle, as well as identification of the time and sequence of initiation , 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 regimes.

BRIEF DESCRIPTION OF THE COURSE

geotectonic hypotheses. "The doctrine of geosynclines" as the first paradigm of geological science. Types of tectonic movements. Modern tectonic movements, methods of their study. Geological formations and their deformations. Fixism and mobility, their differences. Geological and geomorphological features of the oceans. Geological structures of the transition zone from oceans to continents. Folded belts of continents (young platforms). The ancient platforms of the continents are cratons. Areas of continental orogeny. Principles of tectonic zoning and tectonic maps. The main stages of the development of the Earth (AR-PR2). The main stages of the development of the Earth (PR3-KZ).

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

The main types of the earth's crust, the general patterns of evolution of global and large tectonic structures of the earth's crust, the main modern views on the nature and features of the manifestation of tectonic processes, the main provisions of the geotectonic concept "Tectonics of lithospheric plates (TLT)", which is the main paradigm of modern geological science, and also be able to read tectonic maps and sections and display geological structures of various ranks on such maps.

Mineralogy of radioactive and rare earth elements

THE CODE – GEO 227

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: Mineralogy

PURPOSE AND OBJECTIVES OF THE COURSE

Training of specialists in the field of uranium geology with in-depth knowledge of the mineralogy of radioactive elements and their diagnostics. Students will gain knowledge on the mineral forms of finding radioactive and rare earth elements, methods for their diagnosis. Learn to distinguish paragenetic mineral associations according to the conditions of formation of specific minerals, evaluate the prospecting and industrial significance of the corresponding associations with the analysis of ore types and their belonging to the genetic classification of deposits.

BRIEF DESCRIPTION OF THE COURSE

This discipline provides a detailed study of uranium and thorium minerals characterized by a complex and variable chemical composition, which causes the variability of their physical properties. Many of these minerals are similar external features and optical properties, metamict and X-ray amorphous, easily undergo transformations under the influence of superimposed processes (metastable), are in thin intergrowths with other minerals. Assessment of external properties and signs, even supplemented by an optical characteristic, for individual minerals can be insufficient. In such cases, the diagnosis and characterization of minerals are carried out on the basis of a complex of modern methods of analysis.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know: history, subject, tasks and methods of studying crystalline matter; fundamentals of mineralogy and methods for determining uranium minerals (physical, morphological) and their classification; possession of fundamental knowledge in the field of uranium geology and related disciplines at a high level;

Upon completion of the course, students should be able to: interpret geochemical data of rare-metal and radioactive elements (uranium and thorium and REE) , determined by the optical, physico-chemical features of minerals ores of rare and radioactive elements , own methods of visual diagnostics of common minerals; generalize the parameters of elementary cells of minerals and diagnose them by their characteristic properties; conduct independent research in accordance with the developed program; use research results .

Basics of petrology

THE CODE – GEO 231

CREDIT - 5 (2/1/0/2)

PRE-REQUISITE: GEO122 Petrography

PURPOSE AND OBJECTIVES OF THE COURSE

Most of the endogenous deposits are closely associated with magmatites , and they themselves are often minerals. Therefore, for undergraduates in the specialty "Geology and Exploration of MPI", the main goal of studying this discipline is to gain knowledge about the composition, structure, conditions for the formation of magmatites and the relationship of mineral deposits with them.

BRIEF DESCRIPTION OF THE COURSE

Modern data on magmas and their origin: physical and chemical bases of crystallization of magmatic melts; the main reasons for the diversity of magmatites; chemical and mineral composition, structures of magmatites and their genetic significance; rocks of ultramafic, basic medium, acid, foid compositions and their types, varieties, conditions for the formation and connection with it of mineral deposits; examination of them using a polarizing microscope; igneous associations (formations) and series.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know: about the patterns of formation and crystallization of igneous melts, modern classification and nomenclature, chemical and mineral composition, structure and genesis of the main types and varieties of magmatites .

Be able to: analyze the chemical composition of rock-forming minerals, restore the conditions for the formation of igneous rocks, make an assumption about the thermodynamic, chemical and physical conditions of rock crystallization.

Have skills: study of rock-forming minerals using a polarizing microscope.

Petrochemistry

THE CODE – GEO 306

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: Petrography

PURPOSE AND OBJECTIVES OF THE COURSE

The aim of the course " Petrochemistry " is to acquire knowledge for petrogenetic interpretation of the chemical composition of igneous rocks. Assimilation by students of knowledge about the composition and systematics of igneous rocks. Development of practical skills in the application of modern methods of processing petrochemical data.

Tasks:

1. development of basic concepts in modern ideas about the formation of rocks of various chemical composition;
2. development of the ability to control the quality of the chemical analysis of the rock;
3. mastering the basic methods of processing petrochemical data;
4. mastering the main methods and approaches to the interpretation of petrochemical data for igneous rocks of various compositions.

BRIEF DESCRIPTION OF THE COURSE

The discipline "Petrochemistry" is aimed at mastering modern methods and approaches in interpretation of petrochemical data for igneous rocks. Methods of chemical analysis of rocks and control of its quality are considered, as well as error sources. Petrochemical modeling, Harker diagrams are considered and trends on them, petrochemical coefficients and modules, petrochemical conversions, as well as statistical methods. For each breed group (ultrabasic, basic, intermediate, granitoids) a set of discriminant diagrams and approaches to the interpretation of petrochemical data.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know: basic concepts in modern ideas about the formation of rocks of various chemical composition, variations in the concentrations of rock-forming components in the chemical composition of the main groups of rocks and the main factors that determine these variations.

Be able to: evaluate the quality of chemical analyzes of rocks, competently prepare rock samples for analysis of the chemical composition.

Own: methods of petrochemical recalculations, statistical methods of processing petrochemical data, modern approaches to the interpretation of petrochemical data.

Fundamentals of technology of strategic metals

THE CODE – GEO 232

CREDIT - 5 (2/0/1/2)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

This discipline forms knowledge about the physical nature and scope of methods of geophysical well surveys (GIS) in the search and exploration of ore deposits .

BRIEF DESCRIPTION OF THE COURSE

Strategic metals are one of the most important industrial resources. Listing all of their uses would take a long time. However, the main thing that distinguishes them from ordinary metals is that all the latest technologies are tied to them. And in the near future they will hardly be able to find a replacement. All this characterizes rare strategic metals as a valuable object for investment.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

As part of the course, the student will master the practical use of well logging data, processing and interpretation of geophysical data for calculating borehole uranium reserves, as well as for lithological dissection of the section along the wellbore.

Basic knowledge and skills in the field of geophysics, geology, petrophysics , physics, as well as well survey methods in the search and exploration of uranium deposits will be presented. Upon completion of the course, the student must demonstrate the ability to read, process and interpret geophysical data, as well as build a well passport.

Advanced well logging

THE CODE – GEO 214

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course is an in-depth study of the physical foundations of the methods widely used for well survey, as well as methods and methods for interpreting well logging data and modern software.

The objectives of the course are to provide advanced understanding of the geological objects of study penetrated by deep wells, and the spectrum of physical fields used to study rocks in the section of wells that carry information about the geological section and its petrophysical properties.

BRIEF DESCRIPTION OF THE COURSE

The physical nature and scope of electrical, electromagnetic, radioactive, acoustic, thermal, hydrodynamic and geological and technological methods of wells are described.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know: the physical foundations of GIS methods; methods and methods for interpreting well logging data.

Be able to: carry out standard processing and interpretation of well logging data; to obtain estimates of the porosity and porosity characteristics of reservoirs based on the interpretation of the well logging complex; use modern GIS interpretation software; formalize the results of their research activities in the form of a scientific report.

Geooffice GIS data processing and interpretation package Solver , work in a package for processing and interpreting well data.

GIS uranium deposits

THE CODE – GEO 211

CREDIT – 5 (1/0/2/2)

PRE-REQUISITE: GEO115 General geology

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is to familiarize the undergraduate with the theoretical and geological foundations of methods for monitoring the development of reservoirs, the possibility of using geophysical research methods to solve geological and geophysical problems in the construction and operation of oil and gas fields, as well as for production, technological, experimental research, design activities.

BRIEF DESCRIPTION OF THE COURSE

Defining parameters – productive formations and wells by geophysical methods; the formation of the theoretical foundations of the methods of field geophysical surveys among students, the development of the students' ability to implement the acquired skills of conducting independent geophysical surveys of wells and reservoirs; planning, conducting and interpreting the results of geophysical surveys for further application.

KNOWLEDGE, SKILLS AFTER COMPLETING THE COURSE

The necessary conditions for mastering the discipline are:

Knowledge of: the main indicators of the development of hydrocarbon deposits; basic properties of rocks; basics of logging data interpretation; the main instruments and equipment used in geophysical research.

Ability to: apply instruments and equipment for geophysical surveys of wells and reservoirs; interpret the results of geophysical surveys of wells and reservoirs; determine the effectiveness of various GIS methods for solving specific operational and technical problems; give recommendations on adjusting the well operation mode based on well logging data.

Possession: methods for calculating the main technological indicators in the development of oil and gas fields; skills in conducting independent studies of wells and reservoirs; a technique for determining the composition of the fluid in the wellbore, the skills of scientific research.

Methods of lithological research

THE CODE - GEO 223

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: petrography

PURPOSE AND OBJECTIVES OF THE COURSE

Familiarization of students with the systematics of sedimentary rocks; methods of petrographic studies of sedimentary rocks; processes of lithogenesis, diagenesis, catagenesis and metagenesis. The general tasks of studying the discipline are: the study of the petrography of sedimentary rocks, the processes of their accumulation and post-sedimentary changes; study of methods for studying sedimentary rocks; study of methods for describing sedimentary sections, constructing lithological columns and profiles, and methods for their interpretation; study of methods for constructing lithological and paleogeographic maps.

BRIEF DESCRIPTION OF THE COURSE

Fundamentals of the theory of lithogenesis: hypergenesis, its factors, features of weathering in various climatic zones. Sedimentogenesis: features of transport and accumulation of sediments, sedimentary differentiation. Sediment diagenesis. Catagenesis, compaction of sedimentary rocks and processes of neoformation of minerals. Sedimentary facies and their types; features of sedimentary rocks of various facies. Methods of facies analysis: lithological, study of organic remains, study of the form of occurrence and structure of sedimentary rocks and their relationship with surrounding formations, methods of facies mapping.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know: the place of lithology in the cycle of geological sciences; classification of sedimentary rocks, main features of sedimentary rocks and the possibility of their interpretation, stages of sedimentogenesis, processes and results of diagenetic , catagenetic and metagenetic transformations of sedimentary rocks, minerals of sedimentary genesis.

Be able to: document sedimentary sequences, describe lithological thin sections, reconstruct the conditions of their formation and transformation based on the observations made.

Have skills: graphical representation and geological interpretation of lithological data.

Thr geological structures of ore fields and deposits

THE CODE – GEO 208

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: GEO115 General geology

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course "Structures of ore fields and deposits" is to form undergraduates' ideas about the most important types of ore-bearing geological structures and the possibilities of using structural analysis to improve the efficiency of predictive studies and prospecting and exploration.

Tasks - familiarization with the mechanisms of structure formation, mastering the methods of structural research in ore fields and deposits, developing analysis skills ore-bearing structures.

BRIEF DESCRIPTION OF THE COURSE

The course deals with the main types of pre-ore structures of ore fields and deposits, which are most widespread and identified on the basis of structural genetic classification. The role and main types of intraore and postore structures are analyzed, and the characteristics of ore columns are given. The necessary information is provided from the theory of deformation as applied to rocks. The physico-mechanical and other properties of rocks that affect the structural conditions for the localization of ore bodies and deposits are considered. The fundamentals of special methods of structural research on ore fields and deposits .

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know: The main types of ore-bearing structures of deposits and ore fields, as well as the conditions and mechanisms of their formation and development.

Be able to: carry out a comprehensive analysis of ore-bearing structures of deposits for the purposes of forecasting, prospecting and exploration of ore bodies and deposits; predict the position of ore bodies and deposits in structures of various types.

Own: field and laboratory research methods at ore deposits.

Design of hydrogeological and geotechnological wells

THE CODE – GEO 734

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

As part of the course, the student will master the practical application and methods of three-dimensional modeling in geological exploration using software. This requires a modern geologist to have knowledge not only of geology and metallogeny, but also in the field of GIS. As part of the course, a master student will master the practical principles and theoretical foundations of monitoring the state of water bodies, assessing the state of water management engineering systems (structures). Basic knowledge and skills in the field of monitoring water bodies and engineering systems, the principles of organizing monitoring of water sources, predicting water pollution in water bodies will be presented.

BRIEF DESCRIPTION OF THE COURSE

This course covers the main issues related to geographic information systems: GIS provisioning, map projections, thematic cartography, GIS functionality, and some technologies for creating digital maps. In this course, students will master computer literacy in relation to solving geological problems using modern MapInfo programs .

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

The student should be able to: - collect geological data and create thematic maps using GIS programs; - apply GIS technologies to solve geological problems; - analyze spatial data; - evaluate the effectiveness of the use of geoinformation technologies. 2.4 At the end of the course, the student should know: Image registration in MapInfo , vectorization of raster data in the MapInfo environment , analyze spatial data, create thematic maps

Regional geology of the UIS

THE CODE – GEO 240

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: Geology of mineral deposits

PURPOSE AND OBJECTIVES OF THE COURSE

Acquaintance with the features of the geological structure, the history of geological development, the patterns of distribution of mineral deposits and their geological position in the earth's crust of a vast territory occupied by neighboring countries (CIS and Baltic).

BRIEF DESCRIPTION OF THE COURSE

Fundamentals of tectonic zoning of the territory of the CIS and Baltic countries. Ancient platforms: East European platform, Siberian platform. Folded areas of the Ural-Mongolian belt: Ural-Novaya Zemlya folded area, Southern Tien Shan. Kazakh-Kyrgyz folded region, Zaisan folded system, Altai-Sayan folded region, Sayano-Yenisei folded region. Baikal and Transbaikalia. Taimyr-Severozemelskaya region. Young epipaleozoic plates of Eurasia: Scythian and Turanian plates, West Siberian plate. Areas of the Mediterranean belt of Cenozoic (Alpine) folding within Europe: the Eastern Carpathians and the Crimean Mountains, the Caucasian mountain region. Areas of the Mediterranean belt of Cenozoic (Alpine) folding within Asia: Kopetdag and Pamir. Regions of the Pacific belt of Mesozoic and Cenozoic (Alpine) folding: Verkhoyansk-Chukotsak and Kamchatka-Koryak regions. Regions of the Pacific belt of Cenozoic (Alpine) folding: Mongolian-Okhotsk, Sikhote-Alin and Sakhalin folded regions of the Russian Far East. Kuril and Commander Islands.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know: regional structures of the earth's crust of the studied territory in four positions: the principle of tectonic zoning of regional structures; boundaries of each considered structure; know the features of the geological structure of the structure in terms of its stratigraphy and tectonics (development history); highlight minerals structure.

Be able to: analyze the tectonic map and the map of tectonic zoning.

Have skills: analysis, comparison of geological data of one territory with another, reproduction of the history of the geological development of the region and identification of structures and associated types of mineral deposits.

Geochemistry of radioactive elements

THE CODE – GEO 212

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the discipline is to train specialists in the field of uranium geology with in-depth knowledge of the geochemistry of radioactive elements.

The main tasks in the study of the discipline are:

- deep understanding of the conditions and factors of migration and concentration of radioactive elements in geological processes;
- gain knowledge about the mechanisms and forms of transfer and concentration of uranium and thorium in endogenous and exogenous processes;
- to acquire skills in the development of search geochemical criteria and signs of uranium mineralization .

BRIEF DESCRIPTION OF THE COURSE

This discipline provides a detailed study of the geochemistry of uranium and thorium minerals characterized by a complex and variable chemical composition, which causes the variability of their physical properties. Many of these minerals are similar external features and optical properties, metamict and X-ray amorphous, easily undergo transformations under the influence of superimposed processes (metastable), are in thin intergrowths with other minerals.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know: the chemical composition of the Earth, its shells and patterns of migration, concentration and dispersion of radioactive chemical elements in various geological processes and environments.

Be able to: analyze geochemical information and identify regularities in the composition, structure and genesis of various geological formations.

Possess: the skills of thermodynamic assessment of the direction of geochemical processes and the environmental conditions necessary for their course.

Ecological geology

THE CODE – GEO 246

CREDIT - 5 (2/0/1 /2)

PRE-REQUISITE: GEO115 General geology

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is to solve morphological problems related to the study of the composition of the state, structure and properties of the analyzed system, its ecological and geological conditions as a whole. Retrospective tasks related to the study (more precisely, restoration) of the history of the formation of the object of study, the formation of its modern quality. Forecast tasks related to the study of conduction, development trends of the system under study in the future under the influence of various causes of natural and man-made origin.

BRIEF DESCRIPTION OF THE COURSE

Familiarization with the ecological functions of the lithosphere and the whole complex of ecological tasks. Morphological, retrospective, predictive tasks are solved. Theoretical basis of ecological geology. Criteria for assessing the current state of ecosystems. Ecological, resource, ecological, geodynamic, geochemical functions of the lithosphere.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know: basic concepts, object, subject and tasks of ecological geology, correlation of ecological geology and geoecology, ecological functions of the lithosphere, types of lithological systems and their ecological functions, criteria for assessing the current state of ecosystems, methodological foundations of ecological geology, a system of ecological and geological monitoring and methods of ecological - geological mapping, the content of engineering and environmental surveys, the role of environmental geology in the rationale for managing environmental conditions.

Be able to: analyze the structure, historical development of ecological and geological systems, perform predictive constructions;

Have skills: construction of ecological and geological maps, skills in organizing and conducting ecological and geological monitoring, skills in engineering and environmental surveys.

Actual problems of stratigraphy

THE CODE - GEO 283

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: No

PURPOSE AND OBJECTIVES OF THE COURSE

Familiarization and assimilation by undergraduates of the stratigraphic units of development within the geological structures of Kazakhstan.

BRIEF DESCRIPTION OF THE COURSE

Stratigraphy is a special direction in a number of geological sciences, covering the issues of historical sequence, primary relationships and geographical distribution of sedimentary, volcanogenic, volcanogenic-sedimentary and metamorphic rocks that make up the earth's crust and reflect various stages of the development of the Earth. The discipline covers the stratigraphic structure, problems and correlations in the territory of Kazakhstan.

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Familiarization of undergraduates with the most important stratigraphic units of Kazakhstan; mastering the technique of dismembering sections of rock strata and identifying stratigraphic units of different ranks; acquaintance with the principles of creating local, regional and interregional stratigraphic strata; carrying out regional and interregional stratigraphic correlation.

Data mining

THE CODE – GEO 285

CREDIT – 5 (2/0/1/2)

PRE-REQUISITE: GEO115 General geology

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is the concept of data mining as part of the information technology market, the main methodological issues of using various Data tools are considered. Mining . The tasks and methods of data mining are described in detail, as well as various aspects of the practical application of Data Mining .

BRIEF DESCRIPTION OF THE COURSE

Fundamentals of data mining. The concept of data mining . Data Mining as part of the information market technologies . A set of data and their attributes . Tasks of Data Mining . Fundamentals of Data Analysis . Data Mining Methods. Methods of Data Mining . Problems of classification and forecasting . Decision Trees . Support vector machine . Nearest neighbor method . Bayesian classification . Clustering problem . Algorithm k-means (k-means) . Search for association rules . Visualization challenge

KNOWLEDGE , SKILLS AFTER COMPLETING THE COURSE

Know: the basics of higher mathematics, physics, the basics of computer technology and Programming.

Be able to: solve standard professional problems using natural science and general engineering knowledge, methods of mathematical analysis and modeling.

Have skills: Possesses the skills of theoretical and experimental research of objects of professional activity.

Registration and defense of a master's thesis

CODE – ECA 203

CREDIT - 12

The purpose of the master's thesis is:

demonstration of the level of research qualification of a master student, the ability to independently conduct a scientific search, testing the ability to solve specific scientific and practical problems, knowledge of the most common methods and techniques for solving them.

SHORT DESCRIPTION

Master's thesis is a final qualifying scientific work, which is a generalization of the results of independent research by a master student of one of the urgent problems of a particular specialty in the relevant branch of science, which has internal unity and reflects the course and results of the development of the chosen topic.

The master's thesis is the result of the experimental research work of the undergraduate, carried out during the entire period of study of the undergraduate.

The defense of a master's thesis is the final stage in the preparation of a master's degree.

The master's thesis must meet the following requirements:

- the work should carry out research or solve urgent problems in the field of geology, prospecting and exploration of solid minerals
- work should be based on the identification of important scientific problems and their solution;
- decisions must be scientifically substantiated and reliable, have internal unity;
- the dissertation work must be written alone;

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