NPJSC «Kazakh National Research Technical University named after K. I. Satpayev»

Institute of «Geology, Oil and Mining

named after K.Turysov»

Department of «Geophysics»

CURRICULUM PROGRAM

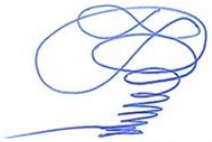
Master of technical Sciences in the educational program 7M07105 - «OIL-GAS AND ORE GEOPHYSICS»

2nd edition
in accordance with the State Educational Standards
of Higher Education 2018

Almaty 2020

The program is drawn up and signed by the:

From KazNRTU named after K. Satpayev:

1. Director of the Institute		**K.B. Rysbekov**
2. Head of Department		**A.E.Abetov**
3. Secretary of Teaching group Department, Senior Lecturer		**G.K.Umirova**

From employers:

1. Candidate of Geological and Mineralogical Sciences, 1 deputy General Director of SPC "GEOKEN" LLP, Laureate of the State Prize of the Republic of Kazakhstan in the field of science and technology named after Al-Farabi	P.N. Kovrizhnyh (review available)
2. Data Center Manager«PGS Kazakhstan LLP», Candidate of Technical Sciences	D.M. Hitrov (review available)
3. Chief Geologist KNOC, Candidate of Geological and Mineralogical Sciences.	A.Zh. Akhmetzhanov (review available)

From partner universities (Perm State National Research University, Tomsk State Technological University):

1.	Head of the Department of Geophysics, Doctor of Technical Sciences, Professor	V.I. Kostitsyn (review available)
2.	Vice Rector for Science	S.O. Makarov (review available)
3.	Doctor of geological and mineral sciences, professor, Corresponding Member RAS of the Russian Federation	V.I. Isaev (review available)

Approved at the meeting of Educational and Methodical Council of Kazakh national research technical university after K.I. Satpaev. Protocol №4 dated 14.01.2020.

Qualification:
Level 7M - National Qualifications Framework
7M071 - Engineering and engineering
7M07105- Oil and Gas and Ore Geophysics

Professional competence: providing deep theoretical knowledge and practical skills in the field of basic research of the earth's crust, methodologies and methods for conducting surface and borehole geophysical studies in the search and exploration of mineral deposits.
A graduate of the department in the master's program must know: the goals and objectives of geophysics in the system of earth sciences; to realize the social significance of their future profession, to have high motivation to carry out professional activities; be able to assess the capabilities of each geophysical method and navigate in terms of the applicability of individual methods; have skills in working with geophysical equipment and geophysical data; and have computer skills as a means of managing information. Demonstrate the ability of the research team to participate in the preparation of reports, abstracts, bibliographies on the subject of scientific research, in the preparation of publications; willingness to work with geophysical data, field and laboratory geophysical instruments, installations and equipment. To put into practice the methods of collecting, processing, analyzing and summarizing stock, field and laboratory geological and geophysical information (in accordance with the profile of preparation); to participate in the organization of scientific and scientific-practical seminars and conferences.

1. Short description of the program

Introduction:

The master's program in the field of "Oil and Gas and Ore Geophysics" ensures the formation of general cultural, general scientific, social, informational, professional and pedagogical competencies; developing undergraduate personality traits such as responsibility, the desire for self-development and the disclosure of their creative potential, owning a culture of thinking, awareness of the social significance of the profession of geophysics, the ability to make organizational decisions in various situations and the willingness to bear responsibility for them.

The master's program in Oil and Gas and Ore Geophysics forms graduates' professional competencies that are necessary to solve complex problems and require: the use of in-depth fundamental knowledge; abstract thinking and originality of analysis; go beyond the issues covered by standards and practice; development of non-standard solutions in problematic tasks; adapting to new situations, reassessing accumulated experience, creating new knowledge based on geophysical research; statement of innovative professional tasks in the field of research and practice; search for optimal solutions to professional problems, taking into account their validity, cost, information, social and economic security; solving managerial problems in the conditions of actually operating production structures.

The master's program in the field of "Oil and Gas and Ore Geophysics" provides: a) the training of highly qualified specialists in the field of geophysical methods of prospecting and exploration of mineral deposits; b) obtaining by them of high-quality and professional knowledge in stages and rational complexes of geological and geophysical research, organization and conduct of field and borehole geophysical observations, processing, interpretation and modeling of the data obtained; c) the acquisition of skills in the analysis of geological and geophysical data, their structuring, classifications of target objects in mineral deposits; statements and solutions of direct and inverse problems in the search and exploration of mineral deposits.

The program includes training in working in modern computer programs Studio RM, Petrel, Eclipse, Surfer, Geosoft, Geolog-Focus, Echos-Gold.

To conduct lectures and consultations on modern problems of the geology of solid minerals, oil and gas, and geophysicists, professors from leading universities of the near and far abroad, leading experts from manufacturing companies and research institutes are invited.

Graduate students practice at research institutes (Institute of Seismology of the Ministry of Education and Science of the Republic of Kazakhstan, K.I.Satpaev Institute of Geological Sciences, KazNIPImunaigas, operator and service companies Karachaganak Petroleum Operating, Tengizchevroil, Kazgeology, PGD Services, “DANK”, PGS, “SPC“ Geoken ”,“ Geo Energi Group ”,“ TatArka ”,“ Kazakstankaspiyshelf ”“ Kazakh Geophysical Company ”,“ Batys geophysical service ”,“ GIS Company ”,“ Azimut Energy Services ”,“ Kazakhmys, Alstron LLP, Azimut Geology LLP, Anega Kazakhstan LLP, Volgovgeology JSC - Geot ekhnotsentr, GISS LLP, DP Ortalyk LLP, Zhanros Drilling LLP, Izdenis LLP, Karakudukmunai LLP, Karazhanbasmunai LLP, KazGIIZ LLP, Kazakhoil Aktyube LLP, Kyzylkum LLP, KOR Oil Company JSC, Uzenpromgeofizika JSC, KATKO JV JSC KazMunayGas JSC, PetroKazakhstan JSC, Bapy Mining LLP, NAK KazAtomProm JSC KAZ

MineralsPLS, GMK Kazakhaltyn JSC, LLP Kazakhaltyn LLP "GEO ENERGY GROUP" and others.\

The best undergraduates can receive additional education under the program of academic mobility at the Colorado Mountain School (USA), Moscow State University, Tomsk Polytechnic University, Frye University, Lorraine University (Nancy, France), Institute of Mining Engineering and Technology (Beijing, China), Adam Mickiewicz University (Poland), University of Warsaw (Poland), Bergakademie Freiberg (Germany), Vrije Universiteit Brussel (Belgium), Natural History Museum (London, United Kingdom) and other universities.

Graduates are qualified as masters of engineering and technology and work in oil and gas and mining companies in engineering positions, and in research institutes as research workers.

Educational program goal:

Training of specialists in oil and gas and ore geophysics with an international level of competence, able to solve the most complex problems of prospecting and development of mineral deposits based on innovative methods and technologies of geophysical research (including modern software), using advanced registration tools for geophysical potential fields.

The objectives of the educational program:

With profile direction:

- development of the ability to independently expand and deepen knowledge in oil and gas and ore geophysics, the needs and skills of independent creative mastery of new knowledge in the field of geophysical methods of prospecting and exploration of mineral deposits;
- training of geophysicists with a high level of professionalism, including the culture of professional communication;
- acquisition of skills in organizing and conducting scientific and applied research, obtaining the necessary knowledge base for continuing scientific work in doctoral studies.

In the scientific and pedagogical direction:

- advanced theoretical and practical training in oil and gas and ore geophysics, as well as pedagogical activities;
- training of competitive specialists with a high level of professional culture, demanded in the labor market and possessing a set of necessary knowledge and skills that can formulate and solve modern scientific and practical problems of oil and gas and ore geophysics, teach at universities, and successfully carry out research and management activities;
- acquisition of skills in organizing and conducting geophysical research, obtaining the necessary backlog for continuing scientific work in doctoral studies;
- gaining knowledge in the field of university pedagogy and psychology and teaching experience at the university.

Area of professional activity includes:

Study of the structure and material composition of the sedimentary cover and lithosphere of the Earth, geophysical searches, exploration and forecasting of mineral deposits, a detailed geological and geophysical study of the structure of oil and gas regions and specific deposits, ore regions and deposits of solid minerals; surface and borehole geophysical surveys at the

stage of prospecting for exploration and additional exploration; geophysical monitoring of the state of the geological environment of exploited mineral deposits.

Professional activities of masters can be carried out in: academic and departmental research organizations related to the solution of geological problems; geological organizations, exploration and mining companies and companies engaged in the search, exploration and production of mineral raw materials; organizations that monitor the environment and are engaged in solving environmental problems; in educational institutions of secondary and higher professional education.

The objects of professional activity of masters are:

Upper crust, rocks and mineral resources; accumulations of hydrocarbons and deposits of solid minerals; geophysical fields; natural and technological geological processes in the areas of exploited mineral deposits, physical and geological models of formations, sections, mineral deposits in the process of exploration and development; computerized and software-controlled information-measuring and processing systems and complexes.

The subjects of professional activity are:

Study of the structure of the earth's crust, physical models of the earth's crust and the physical properties of rocks; conducting scientific research in the field of geoelectric, seismic, gravimagnetic and nuclear geophysical methods, as well as borehole geophysical observations; conducting field observations, processing, interpretation and modeling of the data obtained in the study of geological objects, as well as measures to ensure safety during geophysical work and reduce their technological pressure on the environment.

Types of professional activity:

Masters in the field of training "Oil and Gas and Ore Geophysics" are preparing for research and scientific and industrial professional activities. In accordance with the received fundamental and professional training, they can carry out the following activities:

a) organizational and management activities:

- planning, organization and management of research and scientific-production field, laboratory and interpretation geological and geophysical work;
- development of operational plans for the work of geophysical parties and groups;
- selection and justification of scientific, technical and organizational solutions based on geological and geophysical data and economic calculations.
- Planning and organization of scientific and research seminars and conferences.

b) research activities:

- independent selection and justification of the goals and objectives of geological and geophysical scientific research;
- independent selection and development of methods for solving the tasks in the field, laboratory, interpretation work using modern geophysical equipment, instruments and information technology;
- analysis and generalization of the results of scientific research using modern achievements of science and technology, advanced domestic and foreign experience in the field of geophysics and geology;

- assessment of the results of research geophysical works, preparation of scientific reports, publications, reports, preparation of applications for inventions and discoveries.

c) research and production activities:

- independent preparation and conduct of production and scientific-production, field, laboratory and interpretation work in solving practical problems of geology and geophysics;
- independent selection, training and professional operation of modern geophysical field and laboratory equipment and instruments;
- collection, analysis and systematization of available (a priori) geological and geophysical information using modern information technologies;
- complex processing, interpretation and modeling of field and laboratory information in order to solve scientific and production problems of geology and geophysics;
- determination of the economic efficiency of scientific and production geological and geophysical research;
- participation in the development of normative methodological documents in the field of geological and geophysical work.

d) project activities**:**

- design and implementation of scientific and technical projects in geology and geophysics;
- design work in the field of rational subsoil use and protection of the geological environment;
- participation in the examination of projects of research geological and geophysical work;

e) scientific and pedagogical activity:

- participation in the preparation and conduct of seminars, laboratories and practical classes;
- participation in the management of scientific and educational work of students of the geophysical specialty.

Areas of professional activity:

With profile direction: organizational and technological; settlement and design; service and operational; production and technological activities in:

- The Ministry of Energy and the Ministry of Industry and Infrastructure Development of the Republic of Kazakhstan;
- Academic and departmental research organizations related to the solution of geological problems;
- operator and service companies, leading exploration work

on searches, exploration and additional exploration of mineral deposits, as well as exercising control over the development of these deposits;

- organizations associated with environmental monitoring and solving environmental problems;

In the scientific and pedagogical direction: organizational and management; research; educational (pedagogical) activities of various directions in higher, secondary special and

vocational educational institutions, scientific activities in research institutions, government, educational institutions, design organizations, industrial enterprises corresponding to the profile of specialized magistracy.

2. The scope and content of the program

The volume of the master's educational program (EP) is 131 credits, regardless of the form of training, educational technologies used, the implementation of the master's program using the network form of the master's program according to the individual curriculum.

The EP content of the Master's program in oil and gas and ore geophysics based on the development of a multi-level training system, the fundamentality and quality of education, the continuity and continuity of education and science, the unity of training, education, research and innovation, aimed at maximizing customer satisfaction should ensure:

- Obtaining a full and high-quality professional education in oil and gas and ore geophysics, confirmed by the level of knowledge and skills, competencies, on the basis of criteria established by the State educational standard, their assessment, both in content and volume;

-Providing training for masters in the field of "Oil and Gas and Ore Geophysics" who know the methodological basis, technology and methods of conducting geophysical work, methods of processing, interpretation and modeling of the obtained geophysical data;

- training of professional and competitive highly qualified specialists in the field of oil and gas and ore geophysics, capable of applying innovative methods in the search and exploration of mineral deposits;

- Master's development in the field of "Oil and Gas and Ore Geophysics" of the following abilities: a) apply the knowledge of fundamental and technical sciences, including mathematics, physics, chemistry; b) the acquisition of practical skills in working with geophysical equipment, modern software in the processing, interpretation and modeling of the obtained geological and geophysical data using modern information technologies; c) use the methods, skills and modern technical means necessary for the identification and exploration of oil and gas prospective objects and deposits of solid minerals; d) apply the methods of system analysis in assessing the obtained geological-geophysical and field-geophysical data;

- to form skills for masters in the direction "Oil and gas and ore geophysics": a) to find and work with the necessary literature, computer information, databases and other sources of information to solve the tasks; b) teamwork skills, but at the same time show individuality, and if necessary solve problems independently; c) conduct a comprehensive analysis of geological and geophysical data and monitor geophysical work, as well as make managerial decisions based on their results;

- to form master's production and ethical responsibility, the ability to understand the problem and, through joint work with various specialists, find optimal solutions; the need to improve their knowledge and skills;

- possess erudition, knowledge of modern social and political problems, master the state Russian and foreign languages, instruments of a market economy, issues of safety and environmental protection.

3. Entry Requirements

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

The previous level of education of the entrant is higher education in the field of training specialists in geological exploration, including in the field of ore and oil and gas geophysics.

The applicant must have a state-approved document on higher education (a bachelor's degree in geology or geophysics).

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

Admission is carried out at the request of the applicant, who has completed in full higher education on a competitive basis in accordance with the points in the transcript.

At the "entrance" the applicant must have all PREREQUISITEs necessary for mastering the corresponding educational program of the magistracy. The list of required PREREQUISITEs is determined by the higher education institution independently.

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

4.Requirements for completing studies and obtaining a diploma

As a result of mastering the master's program, the graduate must have formed general cultural, general professional and professional competencies.

A graduate of a specialized magistracy should have an idea about:

current trends in the development of the geophysical specialty;

actual methodological and philosophical problems of oil and gas and ore geophysics;

the current state of the economic, political, legal, cultural and technological environment of the global business partnership.

Graduate must have the ability

to abstract thinking, analysis, synthesis of geological and geophysical information; to be ready to act in non-standard situations, bear social and ethical responsibility for decisions made, show a desire for self-development, self-realization, use of creative potential.

independently acquire, comprehend, structure and use new knowledge and skills in professional activities, develop their innovative abilities; be able to independently formulate research goals and establish a sequence of solving professional problems; put into practice the knowledge of the fundamental and applied sections of the disciplines that determine the orientation (profile) of the master's program.

A graduate of a master's program must possess

professional competencies (PC), corresponding to the type of professional activity, to which the master's program is oriented.

deep systematic knowledge in the field of geophysical methods of prospecting and exploration of mineral deposits.

ability: a) to formulate diagnostic solutions to the geophysical problems of oil and gas and ore geophysics by integrating the fundamental sections of geological sciences and specialized knowledge on geophysical methods of prospecting and exploration of mineral

deposits; b) be able to independently conduct scientific and methodological work and research in geophysics, summarize and analyze experimental information, draw conclusions, formulate conclusions and recommendations.

Masters in the direction "Oil and gas and ore geophysics" should have:

skills in conducting independent production and scientific-production field, laboratory and interpretation geophysical works; the ability to professionally operate modern field and laboratory equipment and instruments.

communication skills for presenting proposals and recommendations orally and in writing.

skills in the preparation and execution of scientific and technical documentation, scientific reports, reviews, reports and articles.

They must skill

critically analyze, represent, defend, discuss and disseminate the results of their professional activities;

use effective methods of processing and interpreting complex information to solve production problems; create and research models of studied objects based on the use of in-depth theoretical and practical knowledge.

Masters must be:

competent in the search and interpretation of technical information using various search engines (patent search, literature review of magazines and books, the Internet), in the selection and creative use of modern equipment for solving scientific and practical problems of oil and gas and ore geophysics;

socially mobile, able to adapt to new situations in a professional environment.

They must have the ability to:

perceive diversity and intercultural difference, appreciate the diverse approaches to understanding and solving society's problems.

organize cooperation in a team, show creativity and breadth of interests for solving interdisciplinary problems. A graduate is required to tolerate social, ethnic, confessional and cultural differences, be capable of criticism and self-criticism, have the skills of interaction and cooperation, be prepared to accept the role of team leader.

Masters must:

appreciate the traditions of other cultures, their diversity in modern society, fundamental basic education, economic, social and legal training.

to be ready for communication in oral and written forms in Kazakh, Russian and foreign languages to solve the problems of professional activity.

to maintain the rules of ethics in society, at work and in interpersonal communication, demonstrate the ability to achieve goals, solve problems in unusual situations.

to take care of environmental protection and, raising qualifications, to serve the development of the welfare of the whole society.

6. Descriptors of the level and scope of knowledge, skills, skills and competencies

6.1 Based on the achievement of training results in OP 7M07105 «Oil-gas and ore Geophysics», the main training framework descriptors based on the Dublin descriptors were 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
в	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 based on the analysis of social, ethical and scientific considerations
d	Communication skills and it skills - by transmitting real and virtual information, problems, their solutions, ideas, and their implementations, both to specialists and non-specialists in the field of study
e	Self-learning and existential skills-by developing self-learning and retraining skills with a high degree of autonomy in the field of study and related fields.

6.2 Based on the achievement of training results in OP 7M07105 «Oil-gas and ore Geophysics», the main framework competencies were adopted:

a	Natural-scientific and theoretical-worldview competences
в	Social and personal and civic competencies
c	General engineering professional competencies
d	Communication and it virtual competencies
e	Special professional competencies, including additional (Minor).

6.3 On the basis of training descriptors and basic framework competencies, a framework characteristic of master's competencies has been adopted that guarantees the achievement of a competitive level in the professional activity market.

On the basis of the specified framework of master's competencies, teachers of the Department of Geophysics form training results, competencies, subcompetencies and a matrix of competencies of disciplines that are part of RUP OP 7M07105 «Oil-gas and ore Geophysics» (table).

7. Competencies acquired by undergraduates during the development of the educational program

General cultural competence (GCC) is aimed at forming the basic competence of the individual, ensuring entry into the world cultural space and self-determination in it, mastering the norms of speech etiquette and literary language, as well as the culture of interethnic communication	
GCC -1	Ability to communicate in oral and written forms in the state, Russian and foreign languages to solve problems of interpersonal and intercultural interaction
GCC -2	Understanding and practical use of healthy lifestyle norms, including prevention issues, and the ability to use physical culture to optimize performance
GCC -3	Ability to analyze the main stages and patterns of historical development of society for the formation of a civil position
GCC -4	Ability to use the basics of philosophical knowledge to form a worldview
GCC -5	Ability to critically use the methods of modern science in practice
GCC -6	Awareness of the need and acquisition of the ability to independently learn and improve their skills throughout their working life
GCC -7	Meaning and understanding of professional ethical standards, proficiency in professional communication techniques
GCC -8	Ability to work in a team, tolerant of social, ethical, religious and cultural differences
GCC -9	Ability to use the basics of economic knowledge in various fields of activity
General professional competence (GPC) is aimed at developing skills for professional choice and creative use of modern scientific and technical tools for solving scientific and practical problems of Geophysics	
GPC -1	The ability to independently acquire, comprehend, structure and use new knowledge and skills in professional activities, develop their innovative abilities
GPC -2	Ability to apply in practice knowledge of fundamental and applied sections of geophysical disciplines that determine the direction (profile) of the master's program in Geophysics
GPC -3	Ability to design and implement complex geophysical and interdisciplinary research. Proficiency in drawing up and processing scientific and technical documentation, scientific reports, reviews, reports and articles in the areas of oil and gas and ore Geophysics;
GPC -4	Ability to critically analyze, present, protect, discuss and disseminate the results of their professional activities; readiness to use modern methods and technologies of scientific communication in the state and foreign languages to solve the problems of professional activity
Professional competence (PC) is aimed at providing deep theoretical knowledge and practical skills in the field of Geophysics in accordance with the requirements of industry professional standards	
PC 1	Knowledge of promising areas of development and problems of Geophysics, the current level of elaboration of problems. Ability to participate in work on innovative projects, set specific geological tasks and solve them based on the use of modern geophysical equipment, software and information technologies using the latest domestic and foreign experience
PC 2	The ability to form diagnostic solutions to professional problems in Geophysics by integrating fundamental and applied sections of Geophysics (gravimagnetization, geoelectrics, seismic, GIS, radiometry) and specialized geological and geophysical knowledge (about physical processes occurring in the Earth and the internal structure of the Earth) for analyzing geophysical data and solving problems in Geophysics
PC 3	Ability to review, analyze and generalize the geological and geophysical information of previous years to select the main parameters of geophysical research, optimize the

	methodology of geophysical observations based on experimental and methodological work. The ability to create a digital database of the original data.
PC 4	Proficiency in professional operation of modern geophysical field and laboratory equipment; determination of technical and technological parameters of equipment, equipment, materials and preparation of equipment for field work (setup, verification or testing, preventive maintenance)
PC 5	The ability of the organization and carrying out of field geophysical works. Skills for primary processing of geophysical data. Ability to solve complex problems that arise during processing, consult with the creators of processing systems and write guidelines for improving the processing graph. Organization of registration of processing results.
PC 6	Ability to organize and conduct geological interpretation of geophysical materials, integrated analysis of geological and geophysical data; geological modeling; map construction; assessment of the quality and accuracy of constructions. The ability of conformity assessment results the interpretation of the observed data. Organizing the design of interpretation results for transmitting them to the customer.
PC 7	Ability to organize and compile a final report on Desk work, including analysis of geological, geophysical text and graphic reporting documentation.
PC 8	Ability to identify and systematize the main ideas in scientific publications; critically evaluate the effectiveness of various approaches to solving geophysical problems; formulate an independent view of the proposed problem taking into account the latest domestic and foreign experience.

7.1 Competence Matrix of the educational program 7M07105 «Oil-gas and ore Geophysics»

Index discipline`s	Name Discipline's	General cultural								General professional				Professional							
		GCC -1	GCC -2	GCC -3	GCC -4	GCC -5	GCC -6	GCC -7	GCC -8	GPC -1	GPC -2	GPC -3	GPC -4	PC -1	PC -2	PC -3	PC -4	PC -5	PC -6	PC -7	PC -8
Required component																					
LNG202	Foreign language (professional)	+					+	+	+												
HUM201	History and philosophy of science	+		+	+	+		+													
HUM207	Higher school pedagogy	+				+	+		+												
GPH296	Modern nuclear technologies in geophysical study	+									+	+	+	+							
GPH256	Integrated analysis of well log data									+	+	+		+	+			+	+	+	+
HUM204	Psychology of management	+			+	+	+	+	+		+	+	+	+							
HUM204	Management psychology										+	+	+		+	+	+			+	
GPH280	Geological and geophysical methods of oil and gas fields exploration	+					+	+	+												
Professional component																					
GPH283	Engineering geophysics										+	+		+	+	+	+	+		+	
GPH284	Geoinformation system (GIS)									+	+	+									
GPH252	The ore and hydrogeological well logging														+	+	+	+		+	+
GPH295	Geological and geophysical methods of ore deposits exploration										+	+									
GPH237	Seismic stratigraphy									+	+	+	+	+	+	+		+	+		+
GPH282	Geological environment modeling based on geophysical data									+	+	+	+	+	+	+		+	+	+	+
GPH281	Earth's remote sensing									+	+	+		+	+		+		+	+	+
GPH250	Methods of complex geophysical									+	+	+	+	+	+		+	+	+	+	+

Index discipline`s	Name Discipline's	General cultural								General professional				Professional							
		GCC -1	GCC -2	GCC -3	GCC -4	GCC -5	GCC -6	GCC -7	GCC -8	GPC -1	GPC -2	GPC -3	GPC -4	PC -1	PC -2	PC -3	PC -4	PC -5	PC -6	PC -7	PC -8
State final attestation																					
ECA205	Registration and defense of the master's thesis (RaDMT)																				
Additional types of training																					
AAP240	Master's student scientific research, including an internship and a master's thesis.																				
AAP241	Master's student scientific research, including an internship and a master's thesis.																				
AAP242	Master's student scientific research, including an internship and a master's thesis.																				
AAP243	Research scientific training																				
AAP244	Pedagogical practice																				

7.5. Requirements for the research work of a graduate student

Research work in the scientific and pedagogical magistracy should:

correspond to the main problems of the specialty in which the master's thesis is defended;

be relevant, contain scientific novelty and practical significance;

be based on modern theoretical, methodological and technological achievements of science and practice;

performed using modern research methods;

contain research (methodological, practical) sections on the main protected provisions;

based on international best practices in the relevant field of knowledge.

The research work (R&D) performed by a graduate student studying under the master's program "Oil and Gas and Ore Geophysics" has a theoretical, methodological or computational character. It is carried out at the graduating department of Geophysics under the supervision of a professor, associate professor or assistant professor. Research may include:

- the study of specialized literature in the field of oil and gas and ore geology and geophysics, the collection of geological and geophysical information, including the achievements of domestic and foreign science and technology in the field of oil and gas and ore geophysics and geophysical methods of prospecting and exploration of mineral deposits;
- collection, processing, analysis and systematization of geological and geophysical information on the topic of final qualification work (dissertation);
- participation in scientific and applied research carried out at the Department of Geophysics, including using modern software;
- compilation of separate sections of scientific reports on the subject of geological and geophysical research carried out at the Department of Geophysics;
- Preparation of reports at student, university, regional or international scientific conferences to assess the level of acquired knowledge, skills and competencies of undergraduates.

The volume of research work of the undergraduate (NIRM) is 7 CREDITs (105 academic hours), respectively 1 CREDIT in the first, second and third semesters and 4 CREDIT in the fourth semester.

The research program of the undergraduate is individual and is reflected in his individual work plan.

7.6. Organization Requirements

The educational program of scientific and pedagogical magistracy includes two types of practices:

1) pedagogical - in the organization of education;

2) research - at the place of the dissertation.

Teaching practice

Pedagogical practice is mandatory because it consolidates the knowledge and skills acquired by undergraduates as a result of mastering theoretical disciplines, develops practical skills and contributes to the integrated formation of universal and general professional competencies.

The purpose of pedagogical practice is to study the basics of pedagogical and educational-methodical work in higher educational institutions, to master the pedagogical

skills of conducting certain types of training sessions and to prepare educational and methodical materials in the main disciplines of the educational program in the field of “Oil and Gas and Ore Geophysics”.

The base for teaching practice is the Department of Geophysics, IGOGI KazNRTU named after K.I.Satpayev.

The objectives of the practice are the acquisition of experience in pedagogical work, as well as:

the formation of a holistic view of pedagogical activity, pedagogical systems and the structure of higher education;

development of sustainable skills for the practical application of professional and pedagogical knowledge obtained in the process of theoretical training;

development of professional and pedagogical orientation of undergraduates; introducing them to real problems and tasks solved in the educational process; the study of methods, techniques, technologies of pedagogical activity in higher education;

development of personal and professional qualities of a teacher.

The volume of pedagogical practice is 1 CREDIT (15 academic hours) in the third semester of the educational program in the field of "Oil and Gas and Ore Geophysics"

Research practice

The objectives of research practice are:

- strengthening the skills of scientific or industrial work of undergraduates in the field of oil and gas and ore geophysics; obtaining experimental (theoretical, laboratory, field) material for writing a master's thesis;
- the formation of the skills of compilation of scientific and technical reports and public presentations at the undergraduate;
- organization of the practical use of the results of scientific developments, including publications, promotion of the results of their own scientific activities;
- the formation and maintenance of effective relationships in the team, work in a team.

The objectives of research practice are:

- ensuring the student’s direct participation in research works on oil and gas and ore geophysics in order to obtain the necessary material to solve a scientific problem or solve a practical geological and geophysical problem;
- the acquisition of professional competencies in accordance with the types and objectives of exploration;
- attracting a graduate student to a scientific discussion in the creative team;
- development of public speaking skills;
- mastering the technical means of presenting the scientific result.

Forms of research practice: field, laboratory, desk.

The content of the research practice of a graduate student depends on the orientation (theoretical, practical geological-geophysical, practical geophysical, engineering-geophysical, etc.), the task and the topic of the master's thesis. It is directly related to the nature and direction of the scientific activity of the organization in which the undergraduate undergoes practical training.

The research practice plan is compiled individually for each undergraduate and is a program of theoretical, experimental or field work in the field of oil and gas or rune geophysics.

This plan provides for: collecting geological and geophysical information on the geological structure of the object of study and the geological and geophysical study of the territory; analysis of data on the physical properties of rocks of the study area; formulation and justification of specific research projects; conducting field, experimental or computational work; processing and interpretation of the materials obtained.

The scope of research practice is 5 CREDITs (75 academic hours) in the third semester of the educational program in the field of "Oil and Gas and Ore Geophysics".

8.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, it 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. In the application model, according to which the estimates will be translated, the European system of transfers or CREDIT re-transfers (ECTS) is used.

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.

According to the sectoral qualifications framework for masters in oil and gas and ore geophysics, exploration includes regional and large-scale geophysical and other surveys, various types of exploration, exploration, hydrogeological and engineering-geological works, which are carried out under the Code of the Republic of Kazakhstan "On Subsoil and Subsoil Use "dated December 27, 2017, No. 125-VI SAM (as amended by the Law of the Republic of Kazakhstan dated 05.24.2018 No. 156) and the Decree of the Government of the Republic of Kazakhstan dated 13 August thick of 2012 No. 1042 "On the Concept for the development of the geological industry of the Republic of Kazakhstan until 2030".

The technological sequence of work for the implementation of this mission involves the preparation of materials and equipment for geophysical work, the design, conduct of pre-field and field geophysical work, as well as desk processing and presentation of the results of complex and specialized geological work, which requires the involvement of geophysicists at level 7.

Master of Oil and Gas and Ore Geophysics - Level 7 of the industry qualifications framework (IQF)

Knowledge - conceptual professional and / or scientific knowledge (including innovative) and experience in oil and gas and ore geophysics and / or at the junction of specialties. Assessment and selection of professional information on geophysical methods of prospecting and exploration of mineral deposits. Creation of new applied knowledge in the field of oil and

gas and ore geophysics. Identification of sources and search for information necessary for the development of activities.

Skills and abilities - solving technological or methodological problems in oil and gas and ore geophysics, requiring the development of new approaches, the use of various methods (including innovative). Correction of the activities of a unit or organization. Ability and skills to scientifically substantiate the setting of goals and the choice of methods and means of achieving them.

Personal and professional competencies

Independence: statement of tasks of both complex and specialized geological and geophysical studies to identify promising objects and processes that are in demand on the domestic market. It provides a selection of methods and techniques for conducting geophysical work, their quality implementation and obtaining specific results.

Responsibility: for the planning, development and results of business processes that could lead to significant changes or development. Responsible for personnel safety, labor protection and the environment.

Complexity: activities involving the solution of development problems, the development of new approaches in oil and gas and ore geophysics, the use of a variety of geophysical methods.

Ways to achieve the qualifications of the corresponding sublevel– Master's and practical experience.

Recommended Job Titles - senior or lead geophysicist.

Satbayev Kazakh National Research Technical Uniuversity
Қ.И.Сәтбаев атындағы Қазақ Ұлттық техникалық университеті

DIPLOMA SUPPLEMENT
 # _____

This Diploma Supplement follows the model developed by the European Commission, 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 - judgements, 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)	
1.4	Graduate Student Identification Number	
2.	INFORMATION IDENTIFYING QUALIFICATION	
2.1	Title of Qualification and the Title Conferred	Master degree in Technics and Technology. Level 7
2.2	Major	«Oil and Gas and Ore Geophysics»
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	Satbayev Kazakh National Research Technical Uniuversity

2.6	Language of Instruction	
3	INFORMATION ON THE LEVEL OF THE QUALIFICATION	
3.1	Level of Qualification	Master degree's level/ second-cycle degree of higher education
3.2	Official Length of Program	2 years
3.3	Access Requirements	
4	INFORMATION ON THE CONTENTS AND RESULTS GAINED	
4.1	Mode of Study	Full-Time
4.2	Program Requirements	The total credits for theoretical education are 59, including 20 credits for basic disciplines, 22 credits for major disciplines, and 17 credits for additional types of education.
4.3	Program Details	*Attached in transcript of records*
4.4	Grading Scheme	**Evaluation GPA Point % Appreciation** A 4 95-100 "Excellence" A- 3,67 90-94 "Excellence" B+ 3,33 85-89 "Good" B 3 80-84 "Good" B- 2,67 75-79 "Good" C+ 2,33 70-74 "Pass" C 2 65-69 "Pass" C- 1,67 60-64 "Pass" D+ 1,33 55-59 "Pass" D 1 50-54 "Pass"
5	INFORMATION ON THE FUNCTION OF THE QUALIFICATION	
5.1	Access to Further Study	Eligible for second-cycle higher education, graduate programs in master

5.2	Professional Status	Under legislation of the Republic of Kazakhstan, a person who was taken Bachelor in Technics is qualified for posts or positions in the industrial, public and scientific sectors for which the qualification requirement is a first higher education degree in major study. In some cases, the qualification requirement also includes the completion of studies in certain specified fields of minor study. The degree is also satisfied and corresponded to the Article 11 of the Directive of the European Parliament on the recognition of professional qualifications under level D of The European Union.
6	ADDITIONAL INFORMATION	
6.1	University Address	22 Satpayev Street, Almaty, 050013, Kazakhstan allnt@ntu.kz www.satbayev.university
6.2	Further information source	http://edu.gov.kz/ru
7	CERTIFICATION OF THE SUPPLEMENT	
7.1	Place and Date	“____’ _____ 201__ Almaty, Kazakhstan
8	INFORMATION ON THE NATIONAL HIGHER EDUCATION SYSTEM	

The education system of the Republic of Kazakhstan consists of basic secondary education, general upper secondary education, vocational upper secondary education, higher education and graduate education. The basic education consists of a 9-year compulsory school for all children from 6 to 15 years of age.
Post-compulsory education is given by general upper secondary schools for 2 or 3 years and vocational upper-secondary institutions. The general upper secondary school provides a 2- or 3-years, at the end of which the pupil takes the Unite National Test (UNT) examination for 2-year study and the Matriculation examination for 3-year study. Vocational institutions provide 3-year programs, which lead to upper secondary vocational qualifications with further the Complex Test Attestation (CTA).

General eligibility for higher education is given by the UNT for a 4-year study, the Matriculation examination or the upper secondary vocational qualification with gained CTA results for a 3-year higher education.
Higher education studies are measured in credits. Study courses are qualified according to the workload required. One year of studies is equivalent to 1600 hours of student work on the average and is defined as 36 National credits or 60 ECTS credits. The credit system after recalculation complies fully with the European Credit Transfer and Accumulation System (ECTS).

8.1	University Degree	The Government Decree on University Degrees (GOSO/2016) defines the compulsory objectives, extent and overall structure of degrees. The universities decide on the detailed contents, curricula, forms of instruction and structure of the degrees they award.

8.2	Second-Cycle (Master degree)	The second-cycle university degree (Master) consists at least 24 (45 ECTS) credits for 1-year full-time study, 36 (67 ECTS) credits for 1.5-years full-time study or 50 (93 ECTS) credits for 2-years full-time study. The degree is usually called Master in Technics or Master in Business Administration for 1 and 1.5-year full-time study; Master in Science for 2-years full-time study. The admission requirements for the second-cycle university degree (graduate) is a first-cycle university degree (undergraduate). General eligibility for the second-cycle education is given by a combination grade of the National Test of English Language unless an applicant has IELTS test results certified 6.0 overall and the Proficiency Examination, which is corresponding to GRE Subject Examination. Studies forwarding to the second-cycle university degree (Master) provide graduate with: (1) profound knowledge of the major subject or a corresponding entity and conversance with the fundamentals of the advanced studies in the field; (2) advanced knowledge and research skills needed to apply scientific knowledge and research approaches required for independent and demanding experimental work (dissertation); (3) good overall knowledge and professional skills in major field needed for operating as an expert and developer of the field; (4) scientific knowledge and interests needed for scientific (Doctoral) or postgraduate education devoted to cutting-edge science; (5) fluent professional English, communication and oral skills. Studies forwarding to degree include at least Intermediate Studies – 8 (15 ECTS) credits and Advanced Studies – 16 (30 ECTS) credits. Additionally, Internship improving expertise – 6 (11 ECTS) credits, a Final Dissertation Work – 6 (11 ECTS) credits.

FOREIGN LANGUAGE (PROFESSIONAL)
CODE – LNG202
ACADEMIC CREDITS – 6 (0/0/3/3)
PREREQUISITE – LNG 1051-1055

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching a foreign language as a general subject of social and humanitarian block in the universities of the above areas is to form the communicative and professional competencies of Masters. Linguistic (language), discursive (speech) and socio-cultural competences are formed as part of communicative competence on an integrative basis.

The content of linguistic competence includes knowledge and ability to apply in communicative and professional activities phonological, lexical, grammatical phenomena of the studied language to a certain extent.

As a result of mastering the discipline the master should:

Know:

– terminology in english in the studied and related fields of knowledge;
– grammatical constructions typical for professionally oriented, technical and scientific materials;
– main features of scientific and technical functional style in both english and russian;
– basic techniques of analytical and synthetic processing of information: semantic analysis of the text by paragraphs, isolation of information units and drawing up a plan of the refereed document in a concise form;
– features of professional etiquette of Western and domestic cultures.

Skill

– read in the introductory reading mode, understanding at least 70 % of the text content, - 500 printed characters per minute;
– read in view reading mode-at least 1000 characters. signs per minute;
– read aloud 600 words fluently. signs per minute;
– to prepare for 45 minutes the interpretation of the text on the profile of their specialty volume of at least 4-4,5 thousand characters;
– to carry out translation of professionally oriented authentic texts of 2000 years. it takes 45 minutes.
– refer professionally-oriented texts and make annotations to them;
– to select, process and design literature on a given professional topic for writing an essay;
– prepare and present technical and scientific information used in professional activities in the form of a presentation;
– listen to authentic audio and video materials related to the direction of training;

Own:

– basic written communication skills necessary for correspondence for professional and scientific purposes;

– skills of performance with the prepared monological message on a profile of the scientific specialty, it is reasoned stating the position and using auxiliary means (tables, schedules, diagrams, etc)

– ability to apply the acquired knowledge in the future professional activity.

HISTORY AND PHILOSOPHY OF SCIENCE

CODE – HUM 201
ACADEMIC CREDITS – 4 (1/0/1/2)
PREREQUISITE – no

COURSE OBJECTIVE

The purpose of teaching the discipline is: the formation of a General scientific, philosophical and methodological, ideological and disciplinary-theoretical basis for scientific and scientific-pedagogical activities of future specialists, scientists, teachers

PURPOSE AND OBJECTIVES OF THE COURSE

The objectives of the study of this discipline are as follows:

– understanding the dynamics of science, its impact on the development of society, the formation of a holistic image of science, awareness of various aspects and contexts of the study of science itself;

– development of relations of science and various sections of philosophical knowledge, expansion and deepening of philosophical problems of separate special scientific disciplines;

– understanding the methodological foundations and problems of modern science, mastering the theory of method as a special teaching on the principles, approaches, techniques, methods of scientific activity, mastering the logic and methodology of science, development of methodological culture of research work.

BRIEF DESCRIPTION OF THE COURSE

Philosophy of science is a necessary condition for the development of relations between science and various sections of philosophical knowledge, expansion and deepening of philosophical problems of certain special scientific disciplines. Philosophical knowledge not only stimulates the development of science, but also organically enters into science as an integral part of scientific knowledge. The philosophy of science acts as the self-consciousness of science in its socio-cultural manifestations, science is comprehended in the context of the spiritual development of society, the value orientations of the development of scientific knowledge, the practice of research activities are formed. The philosophy of science allows us to reveal the foundations of science as a social institution, a powerful productive force, a system of scientific knowledge that forms public consciousness. This knowledge forms the space in which the scientific and pedagogical activity of the future specialist will take place.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

As a result of mastering the discipline the master should:

Know:

The main concepts of modern philosophy of science, the main stages of the evolution of science, the functions and foundations of the scientific picture of the world.

Skill

To use positions and categories of philosophy of science for the analysis and an estimation of the various facts and the phenomena.

Own:

– skills of analysis of the main ideological and methodological problems, including interdisciplinary nature, arising in science at the present stage of its development.

– technologies of planning in professional activity in the sphere of scientific researches.

HIGHER SCHOOL PEDAGOGY

CODE-HUM 207
ACADEMIC CREDITS – 4 (1/0/1/2)
PREREQUISITES – no

COURSE OBJECTIVE

Purpose of the discipline: it consists in forming the foundations of pedagogical culture as the basic basis for further successful mastering of scientific and pedagogical knowledge, skills and values in the field of pedagogical science and practice by undergraduates.

COURSE OBJECTIVE

A specialist with a postgraduate education, focused on future research and teaching activities, should be able to build and manage the pedagogical process, work in a group and with a group, build individual, didactically correct training and education.

BRIEF DESCRIPTION OF THE COURSE

This course aims to provide undergraduates with knowledge of the theory and methodology of teaching in higher education, systematize ideas about the specifics of pedagogical activity, master knowledge about the organization of the educational process and its management, the features of individual mental development and personality formation.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

As a result of mastering the discipline, the master must:

Know:

- specifics of various areas of psychological and pedagogical activity: diagnostics, correction and development, teaching (education), prevention;

- methodological basis for the development and planning of psychological and pedagogical classes;

- functional and organizational and legal bases of professional activity of a psychologist depending on the type of institution.

Be able to:

- make psychological and pedagogical characteristics of both the individual and the team on the basis of the study;

- use psychological methods of development and education of students taking into account their age and individual characteristics;

- organize extracurricular psychological and pedagogical activities aimed at personal development, optimizing the psychological climate of the team, supporting the educational process, self-determination and professional orientation.

Possess the following skills:

- planning of psychological and pedagogical activities (preparation of training programs, event plans, correctional and developmental programs);

- psychological and pedagogical communication both individually and with the audience, taking into account age, social, etc. features;

- joint project execution in a team of colleagues;

- methods of active social and psychological training (discussion, brainstorming, problem lecture, etc.);

- individual psychological methods to increase the motivational potential of students

MANAGEMENT PSYCHOLOGY

CODE-HUM204
ACADEMIC CREDITS – 4 (1/0/1/2)
PREREQUISITES –no

COURSE OBJECTIVE

The goal is to familiarize students with modern concepts of the role and multidimensional content of the psychological component of management activities; to improve the psychological culture of the future master for the successful implementation of professional activities and self-improvement.

COURSE OBJECTIVE

- Study of theoretical and methodological foundations of management psychology-familiarity with various concepts, basic concepts, laws of management psychology.
- Study of the main socio-psychological problems of management and ways to solve them.
- Formation of the undergraduates ' attitude to the mandatory consideration of individual and group psychology in management activities.
- Familiarization with the methods of studying important socio-psychological characteristics of the individual and team, professional, interpersonal and intrapersonal problems by means of management psychology.
- Learning the basics of Executive psychology.
-

BRIEF DESCRIPTION OF THE COURSE

This course aims to familiarize undergraduates with the resource capabilities of the human factor in the management of organizations in modern conditions. The discipline is designed to consider the psychological characteristics of management objects, both personnel and the organization as a whole, and management subjects, which are managers of different levels. The discipline reveals the psychological mechanisms that ensure the effectiveness of management systems, describes modern psychological technologies and approaches to solving management problems.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

As a result of mastering the discipline, the master must:

Know:

- the importance of management psychology in establishing mutual understanding and forming interpersonal relationships in the professional environment,

- the importance of the psychologist's activity in the use of tools and methods of management psychology in professional activities,

- the importance of factors that influence the formation, development and strengthening of management psychology in professional activities.

Be able to:

- determine the characteristics of management psychology in professional activities,

- to implement activities for the development of the strategy and tactics of management psychology.

ENGINEERING GEOPHYSICS

CODE – GPH 283
ACADEMIC CREDITS – 6 (2/0/1/3)
PREREQUISITE – GPH103

COURSE OBJECTIVE

The purpose of the discipline "Engineering geophysics" is the study of surface and borehole geophysical methods for solving problems of engineering geology and other applied problems covering the subsurface depths of the earth's crust.

COURSE TASKS

The objectives of the discipline is to acquire the necessary skills to use the knowledge to solve scientific and practical problems with the use of engineering geophysics.

BRIEF DESCRIPTION OF THE COURSE

Engineering geophysics is one of the main and common methods of solving engineering and geological problems relevant to human life: preparation and control of territories for the construction of buildings, roads, structures and other industrial facilities. The content of the course discusses the theory and practice of setting methods of engineering geophysics, physical and geological foundations of the application of methods, methods and techniques of work and results.

The objects of study are the methods of engineering geophysics and their technical capabilities for solving engineering and geological problems.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

The master must

Know:

Theory and practice of using methods of engineering geophysics, physical bases of application of methods, measuring devices, methodical questions of carrying out field observations. Have an understanding of the causal relationship between geological objects and observed magnetic fields.

Skill

Use the knowledge gained in the study of the discipline, when performing geophysical work to solve practical and scientific and technical problems of engineering geology in the upper part of the section of territories.

Own:

Skills of statement of a method and design of measuring works, preparation of the equipment, carrying out measuring works, principles and technology of processing and interpretation of the data received at field works.

GEOINFORMATION SYSTEM (GIS)

CODE – GPH 284
ACADEMIC CREDITS – 6 (2/0/1/3)
PREREQUISITE – GPH103

COURSE OBJECTIVE

The main purpose of the course is to provide Masters with theoretical knowledge and practical skills necessary to be able to use geographic information systems (GIS) to support and support research in the field of Earth Sciences.

COURSE TASKS

Обучить магистрантов:

– methods of work in modern instrumental GIS; prepare trainees for production work with instrumental GIS;
– the basics of Geoinformatics, methods and technologies of storage and processing of information using computer technology, the use of knowledge to master the theoretical concepts and practical skills of application of geoinformation methods and technologies, databases and knowledge for research in oil and gas and ore Geophysics.

BRIEF DESCRIPTION OF THE COURSE

Basic GIS concepts. Modern methods of creation, editing, storage and organization of spatial data, modern methods of processing and analysis of different types of spatial information and presentation of the results, modern trends in GIS. Creating a digital map using the QGIS and/or ArcGIS software package, defining the structure, creating and filling the attribute data table for the digital map layers. Search for spatial and attribute data stored in GIS for further analysis and processing. Creation of GIS projects for solving geological problems, which are presented in the form of maps with thematic layers.KNOWLEDGE, SKILLS AT THE END OF THE COURSE

The master must

Know:

Bases of planning and creation of projects, specifics and technology of all stages of construction of GIS-projects from field mapping and generalization of external information to electronic representation of systems of the distributed geological data.

Understand the ideology of GIS and their place among other disciplines studied, have theoretical knowledge about the structure of GIS, the analytical capabilities of modern GIS. Navigate GIS terminology, methods of obtaining, storing, editing different types of data, a variety of tools and tools for geoprocessing, methods of data analysis and presentation of results.

Have an idea: about geoinformation systems, which are a virtual environment that simulates and adequately represents the real geological situation.

Skill

Use computer technology to create and edit electronic maps. Be competent in existing and newly developed information storage and processing systems.

Own:

Have the skills to work with information systems. Skills of creation and editing of electronic maps by means of GIS.

GEOLOGICAL AND GEOPHYSICAL METHODS OF ORE DEPOSITS EXPLORATION

CODE – GPH282
ACADEMIC CREDITS – 6 (2/0/1/3)
PREREQUISITES – GPH103

PURPOSE AND OBJECTIVES OF THE COURSE

The discipline is aimed at preparing Masters to master the theoretical and methodological foundations of building three dimensional digital geological models based on geophysical data to solve the following problems:

- prospecting and exploration of mineral deposits;
- calculation of mineral reserves;
- planning of industrial development of mineral deposits;
- engineering surveys and environmental monitoring of subsoil
- evaluation of uncertainties and risks.

BRIEF DESCRIPTION OF THE COURSE

Undergraduate students will receive the following knowledge during the course of the discipline. Theoretical and practical bases modeling of geological environments on geophysical data. Types of modeling, main components of modeling: object, parameters and characteristics of this object, modeling process, modeling results; principles of construction of quantitative physical and geological models (PGM) in solving mapping, prospecting and exploration geological problems in different regions of the Earth; features of modern methods of construction of three-dimensional digital geological models; the accumulated experience of two-dimensional geological modeling for solving practical problems.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Masters who have completed the study of this discipline must:

– understand the basics of developing mathematical principles and algorithms of three-dimensional modeling;

– choose the optimal set of geological, geophysical and field data for modeling geological environments;

– be able to apply knowledge, modern methods and software to build a geological model of the object under study;

– to be guided in modern computer technologies providing a cycle of construction of three-dimensional models (loading, correlation, mapping, construction of cubes of FES, visualization, the analysis of data, delivery of graphics, etc.).

MODERN NUCLEAR TECHNOLOGIES IN GEOPHYSICAL STUDY

CODE – GPH296
ACADEMIC CREDITS – 6 (2/0/1/3)
PREREQUISITE – RYaG 4312.1, GIS 3305.2

COURSE OBJECTIVE

The purpose of the discipline "Modern nuclear technologies in geophysical research" is the study of geophysical methods implemented with the use of nuclear technologies, equipment and equipment.

COURSE TASKS

The objectives of the discipline is to acquire the necessary skills, the application of knowledge to solve scientific and practical problems with the use of nuclear methods.

BRIEF DESCRIPTION OF THE COURSE

The content of the course "Modern nuclear technologies in geophysical research" consists of educational and scientific materials on ground, borehole and laboratory nuclear methods of geophysical research of geological environments and objects (samples).

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

The master must

Know:

Theory and methodology of application of nuclear methods in geophysical research and their possibilities in solving applied problems.

Skill

To use the knowledge gained in the study of the discipline, when performing geophysical work to solve practical and scientific and technical problems of Geology, prospecting and exploration of mineral deposits.

Own:

Skills of selection and formulation of nuclear geophysical methods, assessment of the capabilities of methods for specific geological and other applied tasks.

SEISMIC STRATIGRAPHY

CODE – GPH 237

ACADEMIC CREDITS – 6 (2/0/1/3)

PREREQUISITES – GPH110

THE PURPOSE OF DISCIPLINE

The objectives of the discipline "Seismostratigraphy":

– familiarization with the principles of genetic interpretation of seismic data based on an understanding of the capabilities and limitations of the seismic method;

– study of the history of formation and development of ideas about the methodology and possibilities of using seismostratigraphy to assess the prospects of oil and gas potential and forecast the parameters of the section as a basis for identifying and mapping traps of various types, as well as optimizing the choice of the location of wells.

DISCIPLINE OBJECTIVES

– familiarity with the modern methodology and conceptual framework used in seismostratigraphy;

– assessment and analysis of the capabilities of the seismic method; mastering the technique of genetic interpretation of seismic data;

– calculation of lithophysical and seismogeological parameters of the studied section and models of perspective horizons; kinematic and dynamic binding of reference and conditional reflecting horizons;

– seismic facies analysis and selection of types of seismophations; preparation of lithophysical and geological models of local seismophations;

– construction of structural, paleogeomorphological and sedimentation schemes;

– acquisition of skills in determining the depths of paleobassins and elements of transgressive-regressive cycles from seismic data, paleogeographic and paleotectonic reconstructions.

– forecast of trap types and parameters of their cut.

BRIEF DESCRIPTION OF THE COURSE

Familiarization with the basic lithophysical, seismogeological, mathematical and practical provisions of seismostratigraphy. Analysis of the relationship between physical boundaries and seismic reflections. The contact form of seismic boundaries and associated seismic horizons, geological boundaries and geological bodies.

Geological interpretation of seismic facies is considered; the main concepts and directions of seismic stratigraphic interpretation are structural mapping, lithology, pore fluid, fracturing, pressure, reconstruction of sedimentation conditions, identification of types of traps. calculation of lithophysical and seismogeological parameters of the studied section and models of perspective horizons.

The methods of preparation litvishchenko and local geological models seismic facies; building structural, paleogeomorphic and depositional schemes for the types of traps and their parameters section.

The basic methods of restoration of the history of sedimentary basins and estimation of sea level fluctuations from seismostratigraphic data are given. global and regional cycles of sea level change of the first and second orders. Methods of qualitative and quantitative interpretation of seismic facies. Types of seismic facies and the basics of seismic facies analysis. Computer simulation of seismic facies in modern software. General principles and capabilities, purpose and key phases. Interpretation graph. Examples of the extraction of seismic facies.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

The master must

Know:

– regularities of formation of seismic wave field, rules of interpretation of time sections.

– the role and place of the course seismostratigraphy in the system of specialist training, connection with other disciplines of the geological cycle;

– basic concepts of seismostratigraphy;

– methods of setting and conditions of seismic works, processing and interpretation of seismic data;

– calculation of lithophysical and seismogeological parameters of the studied section and models of perspective horizons; kinematic and dynamic binding of reference reflecting horizons;

– seismic facies analysis, selection of the types of seismic facies; preparation litvishchenko and local geological models seismic facies; the construction of the structural, paleogeomorphic and depositional schemes for the types of traps and their parameters section.

Skill

To use amplitudes, frequencies and other parameters of the wave field in stratigraphic analysis; to identify cycles of relative changes in sea level; to identify seismostratigraphic complexes and give their genetic interpretation; to reconstruct the history of geological development of the area.

Own:

– methods of seismic interpretation using modern computer software;

– skills of obtaining information on the practical application of the seismic-stratigraphic approach in oil and gas Geology;

– skills of complex interpretation of geological and geophysical data in modern software.

GEOLOGICAL AND GEOPHYSICAL METHODS OF ORE DEPOSITS EXPLORATION

CODE – GPH295
ACADEMIC CREDITS – 6 (2/0/1/3)
PREREQUISITES – GPH103

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline "Geological and geophysical methods of prospecting and exploration of ore deposits" is to study the features and possibilities of obtaining geological results in ore areas (fields, areas) with the help of data from ground (aerogeophysical) and borehole methods.

The objectives of the discipline is to acquire the necessary skills, the application of knowledge to solve scientific and practical problems with the use of complex data of geophysical methods and other studies.

BRIEF DESCRIPTION OF THE COURSE

The content of the course "Geological and geophysical methods of prospecting and exploration of ore deposits" consists of educational and methodological, factual and scientific materials obtained from the results of geological and geophysical research. It also includes the choice and effectiveness of these geophysical methods, taking into account the peculiarities of the geological structure of ore media.

The objects of study are geophysical fields of ore-bearing objects of different genetic types and the principles of their interpretation.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

The master must:

Know:.

Methods of application of geophysical methods of research and obtaining their data, features of manifestations of ore-bearing objects of different genetic types in geophysical fields, sequence and principles of geological interpretation of the observed geophysical fields.

Skill:

To use the acquired knowledge when performing geophysical works to solve practical and scientific - technical problems of ore Geology and identify search criteria for mineral deposits.

Own:

Skills of drawing up a complex of geophysical methods for ore geological environments, principles of processing and geological interpretation of data obtained during field work.

GEOLOGICAL AND GEOPHYSICAL METHODS OF OIL AND GAS FIELDS EXPLORATION
CODE – GPH280
ACADEMIC CREDITS – 6 (2/0/1/3)
PREREQUISITES – GPH103

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline "Geological and geophysical methods of prospecting and exploration of oil and gas fields" is to study the features and possibilities of obtaining geological results in oil and gas areas with the help of these terrestrial (aerogeophysical) and borehole methods.

The objectives of the discipline is to acquire the necessary skills, the application of knowledge to solve scientific and practical problems with the use of complex data of geophysical methods and other studies.

BRIEF DESCRIPTION OF THE COURSE

The content of the course "Geological and geophysical methods of prospecting and exploration of oil and gas fields" consists of educational and methodological, factual and scientific materials obtained from the results of geological and geophysical research. It also includes the choice and effectiveness of these geophysical methods, taking into account the peculiarities of the geological structure of oil and gas media.

The objects of study are the geophysical fields of oil and gas structures and the principles of their interpretation.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

The master must:

Know:

Methods of application of geophysical methods of research and obtaining their data, features of manifestations of oil and gas structures in geophysical fields, sequence and principles of geological interpretation of the observed geophysical fields.

Skill:

To use the acquired knowledge when performing geophysical works to solve practical and scientific-technical problems of oil and gas Geology and identify search criteria for mineral deposits.

Own:

Skills of drawing up a complex of geophysical methods for oil and gas-bearing geological environments, principles of processing and geological interpretation of the data obtained during field work.

INTEGRATED ANALYSIS OF WELL LOG DATA

CODE – GPH256
ACADEMIC CREDITS – 6 (2/0/1/3)
PREREQUISITES – GPH103

COURSE OBJECTIVE

Theoretical and practical development of methods of complex processing and interpretation of data of geophysical researches of wells (GIS), definition of the parameters used subsequently at calculation of stocks.

COURSE TASKS

The objectives of the discipline are: selection of the optimal complex and technology of GIS, assessment of the quality of the obtained materials, interpretation of measurement data.

BRIEF DESCRIPTION OF THE COURSE

Complex interpretation of the materials of geophysical research wells (CIGISM) - a set of geophysical methods designed to study the rocks exposed by wells. Geophysical methods are used to study the entire section, opened by the well, and the most detailed - its productive part. The obtained data are used for isolation of interlayers in the productive thickness, which differ from the host rocks in lithological and reservoir properties. Logging diagrams, characterizing the section continuously throughout the wellbore, give the most complete picture of the patterns of change in lithology and the structure of the layers both vertically and by area.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

The master must:

Know:

Characteristics of reservoir layers by a complex of geophysical methods of wells research.

Skill:

To obtain information about the studied sections, to carry out qualitative and quantitative interpretation of geophysical diagrams. Explain diagrams of different GIS methods in oil and gas wells. To solve the issue of rational integration of GIS methods for a particular field.

Calculate the capacity of the productive horizon, estimate the FES reservoir layers. Perform the task of studying the well section of the proposed field. To understand and solve specific problems for GIS systems.

EARTH`S REMOTE SENSING

CODE– GPH 281
ACADEMIC CREDITS – 6 (2/0/1/3)
PREREQUISITES – GPH201

PURPOSE OF DISCIPLINE

The purpose of the discipline is to obtain deep and comprehensive knowledge about remote sensing of the earth(RSE), its practical implementation and visualization tools in solving geological problems

DISCIPLINE OBJECTIVES

– learn the basics of building an image by using electromagnetic radiation in the visible and other parts of the spectrum;

– to consider hardware and technical implementation of receiving, transmitting and transport systems used to obtain remote sensing data;

– to estimate the effect of atmospheric and other distortions on the quality of remote sensing;

– to study the features of different types of data and their suitability for geological interpretation.

BRIEF DESCRIPTION OF THE COURSE

Discipline devoted to the study of physical basis of remote sensing applied methods of photography, the technical implementation of the process of remote sensing from aircraft and satellite transport platforms, technology, interpretation, principles of interpretation, thematic interpretation and mapping, the use of RSE with geological survey and prospecting and exploration of minerals

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

The master must

Know:

Modern types of remote sensing, features of their hardware implementation and thematic tolerance; various indicators of properties and modes of objects of the earth's surface displayed in the expressive means of various AFS and CS; the principle of classification RSE of remote sensing, and their applicability in the practice of geological research.

Skill:

Independently analyze the geological structure (district, region, country) on the materials of different-scale remote sensing, conduct thematic decryption of these materials using computer software, as well as integrate the results into special maps and schemes, and create a geographic information system (GIS) on their basis.

Own:

Skills of interpretation of different types of remote sensing, obtaining qualitative and quantitative characteristics of geological objects, methods of integration of remote sensing in the developed industry GIS.

THE ORE AND HYDROGEOLOGICAL WELL LOGGING

CODE – GPH 252
ACADEMIC CREDITS – 6 (2/0/1/3)
PREREQUISITES – GPH223

COURSE OBJECTIVE

The purpose of the discipline "Geophysical studies of ore and hydrogeological wells" is to study and justify the use of borehole geophysical methods in solving geological and hydrogeological problems.

COURSE TASKS

The objectives of the discipline is the acquisition of knowledge and necessary skills, the application of knowledge to solve scientific and practical problems of downhole Geophysics.

BRIEF DESCRIPTION OF THE COURSE

The content of the discipline "Geophysical studies of ore and hydrogeological wells" covers methodological and technical issues of application of logging methods and obtaining reliable results to determine the parameters of ore and aquifer, as well as host media in the geological section.

The objects of study are ore and hydrogeological wells and basic geophysical methods to solve the problems of the study.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

The master must

Know:

Physical bases of application of methods of logging, technical and methodical questions of reception of geophysical data on wells, theoretical bases of interpretation of physical fields.

Skill:

Use the knowledge gained in the study of the discipline, in the performance of geophysical work to solve practical and scientific and technical problems of ore Geology, hydrogeology.

Own:

Skills of measurement work, the principles of processing and geological interpretation of well data, the choice of rational methods of logging to solve specific problems.

METHODS OF COMPLEX GEOPHYSICAL STUDY

CODE – GPH 250
ACADEMIC CREDITS – 6 (2/0/1/3)
PREREQUISITES: GMRK 3217.1, GMPR 2301.1

DISCIPLINE OBJECTIVES

The main purpose of this course is to provide Masters with the necessary knowledge on the features of typical and modern geophysical equipment, methods of measurement and processing of field data using geophysical equipment, as well as the main modifications and modern technologies of field and laboratory geophysical research.

Master of geophysics, prepared by the master's program, should be able to solve the following problems:

– effective application of modern geophysical equipment and modern technologies to solve practical problems;
– processing of primary data, analysis and systematization of geological-geophysical and ecological-geophysical information using modern methods of collection and processing of geophysical data;
– assessment of the state of geophysical equipment and installations for prospecting and exploration of mineral deposits;
– examination of production and research works in the field of geophysical research technology

BRIEF DESCRIPTION OF THE COURSE

The process of studying the discipline is aimed at studying the equipment, methods and technology of field geophysical research (gravity, magnetic, electrical, seismic), geophysical research wells and other methods for solving General geological problems, prospecting and exploration of mineral deposits, as well as for solving engineering and environmental and hydrogeological problems.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Masters who have completed the study of this discipline must:

– be able to choose a set of geophysical methods for solving geological, engineering and environmental problems;
– to justify the choice of hardware-software analog-digital complex for recording data of geophysical methods, both in the laboratory and in the field;
– use the necessary equipment and equipment for geophysical research;
– to solve the current problems related to the methodology of field geophysical work;
– to carry out testing of programs of digital registration and data processing of a complex of geophysical methods.
– analyze and evaluate the quality of the results of field registration and primary processing of geophysical data.