NJSC «Kazakh national research technical university named after K.I. Satpayev»

Institute of Metallurgy and Industrial Engineering

Department of "Technological machines, transport and logistics»

CURRICULUM PROGRAM

"Operational Service Engineering"

Bachelor of engineering and technology

based on the following specialties, the expired Classifier of specialties: «5B072400 - Technological machines and equipment (by branches)»

2st edition
in accordance with the State Educational Standard of Higher Education 2018

Almaty 2020

The program is compiled and signed by the parties:

from KazNRTU named after K.Satpayev:

1. The head of the department TM&TL — K.K. Elemesov
2. Director of M&MI — K.K. Elemesov
3. Chairman of EMC TM&O Department — L.A. Krupnik

From employers:

1. Member of the Council of the Institute. Director-Vice-rector for methodological work of the branch of KYAU "IVT" LLP — Iskulov S. S.
2. General Director of Burmash LLP — G.A. Kudaykulova
3. Commercial Director of JSC "AZTM" — M. Kanatbaev

Approved at the meeting of the Educational and Methodological Council of the Kazakh National Research Technical University named after K. Satpayev.

Qualification:
Level 6 of the National Qualifications Framework:
6B071 Engineering and Engineering (Bachelor):
6B07107 Operational Service Engineering

Professional competence: providing deep theoretical knowledge and practical experience in the manufacture and operation of technological machines and equipment; ability to manage their time, plan and organize activities for the maintenance and repair of technological machines and equipment; to be in charge of the main technological processes in the welding industry, mining and smelting industry, and the oil and gas industry in order to select the optimal energy and resource-saving modes of operation of machinery and equipment

1 BRIEF DESCRIPTION OF THE PROGRAM

The educational program "Operational Service Engineering" covers the specialty "Technological Machines and Equipment" in the following fields:

- metallurgical machines and equipment;
- mining machines and equipment;
- machines and equipment of the oil and gas industry.

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

• The Law of the Republic of Kazakhstan “On Education” with amendments and additions within the framework of legislative changes to increase the independence and autonomy of universities dated 04.07.18 № 171-VI.

• The Law of the Republic of Kazakhstan “On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on the Expansion of the Academic and Management Independence of Higher Education Institutions” dated 04.07.18 №171-VI.

• Order of the Minister of Education and Science of the Republic of Kazakhstan dated 30.10.18, №595 “On approval of the Model Rules for the activities of educational organizations of the corresponding types”.

• The state compulsory standard of higher education (Appendix 7 to the order of the Minister of Education and Science of the Republic of Kazakhstan dated 31.10.18. №604.

• Decree of the Government of the Republic of Kazakhstan dated 19.01.12, №111 “On approval of the Model Rules for admission to study at educational organizations implementing educational programs of higher education” with amendments and additions from 14.07.16 № 405.

• ‘National Qualifications Framework”, approved by the protocol of March 16, 2016 by the Republican tripartite commission on social partnership and regulation of social and labor relations.

• ndustry qualification framework in the field of "mechanical engineering". Order No. 446 of the acting Minister of industry and new technologies of the Republic of Kazakhstan dated December 27, 2013.

The purpose of the educational program of the specialty "Operational Service Engineering" is to provide comprehensive and high quality training of competitive, highly qualified specialists who are ready to solve practical and theoretical problems of professional activity in modern conditions on the basis of the development of skills and abilities necessary for the future specialist.

The field of professional activity of the bachelor of the educational program "Operational Service Engineering" includes:

- sections of science and technology containing a set of tools, techniques, methods and methods of human activity aimed at creating competitive engineering products and based on the use of modern methods and tools for designing, calculating, mathematical, physical and computer modeling;
- organization and execution of works on the creation, installation, commissioning, maintenance, operation, diagnostics and repair of technological machines and equipment, on the development of technological processes for the production of parts and components.

The objects of professional activity of the bachelor are:

- technological machines and equipment of various complexes;
- technological equipment and means of mechanization and automation of technological processes;
- production processes, their development and development of new technologies; - installation and repair of technological machines and equipment;
- means of information, metrological, diagnostic and management support of technological systems to achieve the quality of the products;
- means of testing and quality control of technological machines and equipment;
- regulatory and technical documentation, standardization and certification systems, methods and means of testing and quality control of products.

Types of professional activity are:

- experimental research;
- settlement design and analytical;
- production and technology;
- service and operational;
- installation and commissioning; - organizational and managerial.

Subjects of professional activity of the bachelor is:

- technological machines and equipment; power equipment; welding equipment; drive systems; traffic control systems; operator life support systems;
- construction and maintenance materials;
- equipment for the manufacture, testing and disposal of technological machines;
- equipment for maintenance and repair of technological machines;
- instrumentation for the manufacture and operation of machines; - equipment for automation of working processes of machines; - equipment for the design of machines.

2 VOLUME AND CONTENTS OF THE PROGRAM

The volume of the undergraduate education program is 240 credits, regardless of the form of study, the applied educational technologies, the implementation of the undergraduate program using the network form, the implementation of the undergraduate program for the individual curriculum, including accelerated education.

The content of the OP "Operational Service Engineering" based on the development of a multi-level system of personnel training, the fundamentality and quality of training, continuity and continuity of education and science, the unity of training, education, research and innovation activities aimed at maximizing customer satisfaction should ensure:

- obtaining a full-fledged and high-quality professional education in the field of mining, metallurgy, oil and gas production, welding production, confirmed by the level of knowledge and skills, skills and competencies on the basis of established State educational standards and criteria, their assessment, both in content and in volume;
- ensuring the preparation of bachelors for industries that know the methods and principles of research, design, production and operation of materials and products;
- training of professional and competitive specialists in the field of miningmetallurgical and oil-gas production machinery and equipment, and production management
- to formulate the main technical and economic requirements for equipment, methods and modes of preparation of the source material, the definition of technological parameters of the process in order to obtain the required properties and product quality;
- the ability to use the methods, skills and modern technical means necessary in engineering practice;
- the ability to find and work with the necessary literature, computer information, databases and other sources of information to solve the tasks;
- to form students' teamwork skills, production and ethical responsibility, the ability to understand the problem and, from working with various specialists, find solutions, the need to improve their knowledge and skills;
- the ability to position oneself in solving and formulating technical tasks within a single information space of a metallurgical enterprise;
- the ability to work in a team on interdisciplinary topics, at the same time to show individuality, and if necessary, to solve problems independently;
- readiness of students for professional activities through disciplines that provide fundamental knowledge, skills and abilities to work in production, government organizations and educational institutions;

- ability to apply knowledge of physics, mathematics, basic and technical sciences for practical activities;
- be able to analyze and monitor, and also make management decisions based on their results;
- possess erudition, knowledge of modern social and political problems, own state Russian, and foreign languages, market economy tools, safety and environmental issues.

Objectives of the educational program:

- study of the cycle of general education disciplines for the provision of social and humanitarian education on the basis of the laws of the socio-economic development of society, history, modern information technologies, the state language, foreign and Russian languages;
- study of the cycle of basic disciplines to provide knowledge of natural science, general technical and economic disciplines, as the foundation of vocational education;
- the cycle of the main disciplines is focused on the study of key theoretical aspects of technological machines in general, theoretical and practical techniques, methods and methods of human activity aimed at creating competitive technological machines and based on the use of modern methods and design tools, mathematical, physical and computer modeling of technological processes and equipment;
- the study of disciplines that form knowledge skills and abilities of planning and organizing research, designing technologies and devices;
- familiarization with the technologies and equipment of enterprises in the period of various types of practices.
- the acquisition of skills and abilities of laboratory research, technological calculations, equipment selection and design using modern computer technologies and programs.

3 REQUIREMENTS FOR APPLICANTS

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

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

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

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

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

Code	Type of competence	Competency description	Result of competence	Responsible
GENERAL (It implies full training with possible additional depending on the level of knowledge)				
G1	Communication skills	- Fluent mono-speaking oral, written and communication skills - ability to communicate fluently with a second language - Ability to use communicative communication in different situations - there are the basics of academic writing in their native language - language level diagnostic test	Full 4-year education with the development of at least 240 academic credits (of which 120 contact academic lending) with the possible transfer of credits in the second language where students have advanced level The language level is determined by taking a diagnostic test.	Department of Kazakh and Russian, Department of English

G2	Math literacy	asic mathematical thinking at the communication level - the ability to solve situational problems on the basis of the mathematical apparatus of algebra and began mathematical analysis - diagnostic test for mathematical literacy in algebra	Full 4-year education with the development of at least 240 academic credits (of which 120 contact academic lending). If the diagnostic test is passed positively, the level is Mathematics 1, if it is negative, the level is Algebra and the analysis starts	Department of Math
G3	Basic Literacy in Natural Sciences	- a basic understanding of the scientific picture of the world with an understanding of the e of the basic laws of science - understanding of basic hypotheses, laws, methods, formulation of conclusions and estimation of errors	Full 4-year education with the development of at least 240 academic credits (of which 120 contact academic lending). If the diagnostic test passes the positive level, Physics 1, General Chemistry, with a negative level, the level of the Principles of Physics and Basic fundamentals of chemistry	Chairs in the areas of natural sciences
SPECIFIC (implies reduced education due to credit transfer depending on the level of knowledge in competencies for graduates of 12-year schools, colleges, universities, including humanitarian and economic areas)				

S1	Communication skills	Fluent bilingual oral, written and communication skills - ability to communicate fluently with a third language - writing skills of the text of a different style and genre - skills of deep understanding and interpretation of own work of a certain level of complexity (essay) - basic aesthetic and theoretical literacy as a condition for full perception, interpretation of the original text	Full credit transfer by language (Kazakh and Russian)	Department of Kazakh and Russian language
S2	Math literacy	Special mathematical thinking using induction and deduction, generalization and concretization, analysis and synthesis, classification and systematization, abstraction and analogy	Transfer credits to the discipline Mathematics (Calculus) I	Department of Math
		- ability to formulate, substantiate and prove provisions - the use of general mathematical concepts, formulas and extended spatial perception for mathematical problems complete understanding of the basics of mathematical analysis		

S3	Special literacy in the natural sciences (Physics, Chemistry, Biology and Geography)	A broad scientific perception of the world, providing a deep understanding of natural phenomena - critical perception for understanding the scientific phenomena of the world - cognitive abilities to formulate a scientific understanding of the forms of existence of matter, its interaction and manifestations in nature	Transfer credits for Physics I, General Chemistry, General Biology, Introduction to Geology, Introduction to Geodesy; Educational practice, etc.	Chairs in the areas of natural sciences
S4	English	- readiness for further selfstudy in English in various fields of knowledge - readiness to gain experience in project and research work using the English language	Transfer credits of English language above academic to professional level (up to 15 credits)	Department of English
S5	Computer skills	Basic programming skills in one modern language - use of software and applications for training in various disciplines -the presence of a global standard language level certificate	Transfer credits to the discipline Introduction to information and communication technologies, Information and communication technologies	Department of Software Engineering
S6	Sociohumanitarian competences and behavior	- understanding and awareness of the responsibility of every citizen for the development of the country and the world	Transfer credits on modern history Kazakhstan (except for the state exam)	Department of Social Studies
PROFESSIONAL (implies reduced education due to credit transfer depending on the level of knowledge in competencies for graduates of colleges, AV schools, universities, including humanitarian and economic areas)				

P1	Professional competencies	-critical perception and deep understanding of professional competencies at level 5 or 6 - Ability to discuss and argue on professional issues within the framework of the mastered program	Transfer of credits to basic professional disciplines, including an introduction to the specialty, structure and construction of systems and machines by industry, after-sales service of machinery by industry, educational and industrial practice	Graduate Chair
P2	General engineering competence	basic general engineering skills and knowledge, ability to solve general engineering tasks and problems - be able to use application packages for processing experimental data, solving systems of algebraic and differential equations	Transfer credits in general engineering disciplines (Engineering graphics, descriptive geometry, fundamentals of mechanics, fundamentals of hydrodynamics, fundamentals of electrical engineering, fundamentals of microelectronics, fundamentals of thermodynamics, fundamentals of geology, etc.)	Graduate Chair

P3	Computer engineering competence	basic skills of using computer programs and software systems for solving general engineering tasks	Transfer credits in the following computer graphics disciplines, CAD basics, CAE basics, etc..	Graduate Chair
P4	Engineering competence	- skills and abilities to use technical equipment and experimental devices for solving general engineering tasks	Transferring credits to academic disciplines of the experimental direction: turning and plumbing, repairing, welding, laboratory or analytical chemistry, laboratory physics, mineralogy, etc.	Graduate Chair
P5	Socio-economic competence	- Critical understanding and cognitive abilities to argue on contemporary social and economic issues - Basic understanding of the economic evaluation of objects of study and profitability of industry projects	Transfer credits for socio-humanitarian and technical and economic disciplines into the elective cycle	Graduate Chair

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

4 REQUIREMENTS FOR COMPLETING STUDIES AND OBTAINING A DIPLOMA

The graduate of this educational program is awarded an academic degree "Bachelor of Engineering and Technology."

Graduated bachelors should have deep knowledge and skills in the field of machinery and equipment of the mining and metallurgical, oil and gas industry and in the field of welding. Specialists should have practical experience on the basis of studying basic and specialized disciplines, and studying techniques and technologies during the passage of all types of practices. They must have the knowledge and skills to analyze the technology and identify existing problems. Specialists should be able to develop equipment projects taking into account mechanical, technological, design, operational, ergonomic, aesthetic and economic parameters.

Bachelors must have communication skills in order to be able to present their ideas and information, orally and in writing. The specialist should be able to provide graphic information in the form of drawings, tables, slides and drawings. He must be competent in finding and interpreting technical information using various search engines (patent search, literature review of magazines and books, the Internet).

Bachelors must be socially mobile, able to adapt to new situations in a professional environment. The specialist should have the ability to perceive diversity and intercultural difference, to appreciate the various approaches to understanding and solving the problems of society.

Bachelors should be able to organize cooperation in a team, to show creativity and the breadth of interests to solve interdisciplinary problems. The specialist must be tolerant, capable of criticism and self-criticism and be prepared to accept the role of team leader and have the skills of interaction and cooperation. The bachelor - mechanic must have an ethical education and continue his development through selfimprovement and lifelong learning.

Bachelors should know Kazakh, Russian and English well, and be able to work in the international community. A specialist should have good communication skills, appreciate the traditions of other cultures, their diversity in modern society.

Bachelors must have: fundamental basic education, economic, social and legal training. The bachelor-mechanic must know and support the rules of ethics in society, in industry and in interpersonal communication. They must demonstrate skills in achieving goals, solving problems and finding non-standard solutions. Specialists should take care of environmental protection and raising their skills to serve the development of the welfare of the whole society.

5 CURRICULUM WORK PLAN

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
SATBAYEV UNIVERSITY

SATBAYEV UNIVERSITY

APPROVED
Rector of Satbayev University
I.K. Beisembetov
«15» 09 2020

MAJOR CURRICULUM for 2020-2021 academic year admission
Educational program 6B07107 - "Maintenance and Service Engineering"
Group of Educational programs B064 - "Mechanics and metal working"

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

Year of st	Code	Name of discipline	Cycle	Total Credits	lec/lab/pr/l WS	Code	pre-requisites
		1 semester (fall 2020)					
1	LNG 1051	Beginner (A1)	G	6	0/0/3/3	S4	Diagnostic test
	LNG 1052	Elementary English (A1)					
	LNG 1053	General English 1 (A2)					
	LNG 1054	General English 2 (A2)					
	LNG 1055	Academic English (B1)					
	LNG1056	Business English (B2)					
	LNG1012	Kazakh/Russian (A2)	G	4	0/0/2/2	S1	Diagnostic test
	LNG1012.1	Academic Kazakh/Russian (B1)					
	LNG1012.2	Business Kazakh/Russian (B2)					
	MAT00110	Algebra & introduction to calculus	B	6	1/0/2/3	S2	Diagnostic test
	MAT101	Calculus I					
	PHY110	Physics Begin	B	6	1/1/1/3	S3	Diagnostic test
	PHY111	Physics I					
	HUM113	Contemporary History of Kazakhstan	G	6	1/0/2/3	S6	no
	TEC193	Introduction to specialty	B	6	2/0/1/3	P1-3	no
	KFK101	Physical education I	G	4	0/0/2/2	no	no
		Total:		38	19		
		3 semester (fall 2021)					
2	LNG 1053	General English 1 (A2)	G	6	0/0/3/3	no	LNG 1052
	LNG 1054	General English 2 (A2)					LNG 1053
	LNG 1055	Academic English (B1)					LNG 1054
	LNG1056	Business English (B2)					LNG 1055
	LNG 1057	Professional English (B2+)					LNG1056
	MAT102	Calculus II	B	6	1/0/2/3	no	LNG1056
	MAT103	Calculus III					MAT101
	CSE174	Information & Communication Technologies	G	6	2/0/1/3	S5	MAT102
	PHY112	Physics II	B	6	1/1/1/3	no	no
	2209	Elective					PHYS111
	PED413	Interchangeability, standardization and technical measurements	B	6	2/1/0/3	P1-3	PHY111
	GEN146	Theoretical and applied mechanics	B	6	2/1/0/3	P1-3	PHY112
		Total:		36	18		
		5 semester (fall 2022)					
3	MAT126	Ordinary Differentiation Equations MatLab	B	6	1/0/2/3	no	MAT103
	MAT127	Partial Differentiation Equations MatLab					MAT126
	3217	Elective	B	6		P1-3	
	3218	Elective	B	6		P1-3	
	3219	Elective	B	6		P1-3	
	3301	Elective	S	6		P1-3	
		Total:		30	15		
		7 semester (fall 2023)					
4	3304	Elective	S	6		no	
	3305	Elective	S	6		no	
	3306	Elective	S	6		no	
	3307	Elective	S	6		no	
	ECA101	Preparation & writing of thesis (project)	FA	4			
		Total:		28	12		

Code	Name of discipline	Cycle	Credits	lec/lab/pr/l WS	Code	pre-requisites
	2 semester (spring 2021)					
LNG 1052	Elementary English (A1)	G	6	0/0/3/3	S4	LNG 1051
LNG 1053	General English 1 (A2)					LNG 1052
LNG 1054	General English 2 (A2)					LNG 1053
LNG 1055	Academic English (B1)					LNG 1054
LNG1056	Business English (B2)					LNG 1055
LNG 1057	Professional English (B2+)					LNG1056
LNG1102.1	Academic Kazakh/Russian (B1)	G	6	0/0/3/3	S1	LNG10121
LNG1102.2	Business Kazakh/Russian (B2)					LNG1012.1
	Elective					LNG1012.2
MAT101	Calculus I	B	6	1/0/2/3	no	MAT100
MAT102	Calculus II					MAT101
PHY111	Physics I	B	6	1/1/1/3	no	PHY110
PHY112	Physics II					PHY111
GEN101	Engineering and Computer Graphics	B	6	1/0/2/3		no
TEC178	Construction materials of technological machines and equipment	B	6	2/1/0/3	P1-3	no
KFK102	Physical education II	G	4	0/0/2/2	no	no
Total:			40	20		
	4 semester (spring 2022)					
LNG 1054	General English 2 (A2)	G	6	0/0/3/3	no	LNG 1053
LNG 1055	Academic English (B1)					LNG 1054
LNG1056	Business English (B2)					LNG 1055
LNG 1057	Professional English (B2+)					LNG1056
	Elective					LNG1056
MAT103	Calculus III	B	6	1/0/2/3	no	MAT102
MAT126	Ordinary Differentiation Equations MatLab					MAT103
HUM124	Phylosophy	G	6	1/0/2/3	S6	no
PED435	Welding and cutting of metals	B	6	2/1/0/3	P1-3	PHY111
PED439	Basics of hydraulics and hydraulic drives of technological machines	B	6	2/0/1/3	P1-3	PHY111
HUM126	Social & Political Knowledge	G	8	4/0/0/4	S6	no
2215	Elective	B	6	2/1/0/3	P1-3	
Total:			44	22		
	6 semester (spring 2023)					
MAT106	Partial Differentiation Equations MatLab	B	6	1/0/2/3	no	MAT126
3220	Elective	B				
AUT146	Basics of Automation	B	6	2/1/0/3	P1-3	PHYS111
TEC179	Installation and exploitation of technological machines	S	6	2/0/1/3	no	PED413
TEC180	Repair of technological machines	S	6	2/0/1/3	no	TEC178
Total:			24	12		
	8 semester (spring 2024)					
3308	Elective	S	6		no	
3309	Elective	S	6		no	
3310	Elective	S	6		no	
ECA101	Preparation & writing of thesis (project)	FA	4			
ECA102	Thesis (project) defence	FA	6			
Total:			28	9		

Additional academic programes (AAP)

Year of study	Code	Name of discipline	Credits	Semester
2	AAP122,132	Physical education III, IV	0	3-4
1	AAP101	Internship	2	2
2	AAP109	Industrial internship I	2	4
3	AAP103	Industrial internship II	4	6
2-3	AAP500	Military training	0	3-6

Total number of credits

Cycle of disciplines	Credits: compul-sary	elective	total
Cycle of general disciplines (G)	58	10	68
Cycle of basic disciplines (B)	126	0	126
Cycle of special disciplines (S)	60	0	60
Total of theoretical study :	244	10	254
Extra education	8	0	8
Final attestation (FA)	14	0	14
Total:	22	0	22
The auditory volume of the credits of theoretical training	121	6	127

Decision of the Academic Council Satbayev University. Minutes # 3, dated "15" 09 2020

Decision of the Educational and Methodological Board of Satbayev University. Minutes # 4, dated "14" 01 2020.

Decision of the Academic Council of the School of Metallurgy and Industrial Engineering. Minutes # 3, dated "23" 10 2019.

Vice-rector for academic affairs — B.M. Iskakov

Chairman of Academic Planning Committee — K.B. Tulegenova

Director of the School of Metallurgy and Industrial Engineering — G.S. Turysbekova

Head of department "Technological machines and equipment" — K.K. Yelemessov

Representative of Specialty council — M.A. Kanatbaev

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
SATBAYEV UNIVERSITY

SATBAYEV UNIVERSITY

APPROVED
Director of the Institute of Metallurgy and Industrial Engineering
_____ K.K. Yelemessov
"___" _____ 2020

MAJOR ELECTIVE DISCIPLINES for 2020-2021 academic year admission
6B07107 - "Operational Service Engineering"

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

Year of study	Code of elective	Code of discipline	Name of discipline	Cycle	Credits	lec/lab/pr/IWS	Prerequisites
			2 semester (spring 2021)				
1	1101	LNG1074	Business Kazakh language /Advanced Russian language (B2)	G	6	0/0/3/3	LNG1073
		LNG1075	Kazakh (Russian) language. Rhetoric (C1)				
		LNG1076	Kazakh (Russian) language. Culture of business communication (C1)				
			Total:		**6**		
			3 semester (fall 2021)				
2	2209	TEC169	Drives of mining machines and fixed installations	B	6	2/1/0/3	GEN146
		PED430	Technique of field experiment			2/1/0/3	TEC193
		TEC148	Fuels, oils and special liquids			2/0/1/3	PHY111, GEN146
		PED414	Friction and wear			2/0/1/3	PHY111 GEN146
			Total:		**6**		
			4 semester (spring 2022)				
2	2108	LNG109	IELTS Preparation	G	6	0/0/3/3	LNG 1056
		LNG110	Intercultural Communication				
		LNG117	Technical Writing				
		LNG118	Public speaking				
		LNG119	Productivity skills				
		LNG120	GRE preparation				
		LNG121	Academic Writing				
	2215	PED114	Computer-aided design of technological machines	B	6	1/2/0/3	PHY111, GEN101
		TEC118	Calculation and design of technological machines and equipment			1/2/0/3	PHY111, GEN101
		TEC403	Computer simulation of machine parts			1/2/0/3	PHY111, GEN101
		TEC409	Computer technologies for calculation, modeling and design			1/2/0/3	PHY111, GEN101
			Total:		**12**		
			5 semester (fall 2022)				
3	3217	MIN407	Open-cast mining technology	B	6	2/0/1/3	PHY112
		PED175	Auxiliary transport equipment of metallurgical workshops			2/0/1/3	PHY112
		PED445	Fundamentals of Research and Development			2/0/1/3	MAT102, PHY112
		PED446	Fundamentals of the theory of reliability of machines and mechanisms			2/0/1/3	MAT102, PHY112
		TEC410	Fundamentals of the theory of wear of machinery and equipment			2/0/1/3	MAT102, PHY112
	3218	TEC105	Mining machines and equipment	B	6	2/1/0/3	PHY112
		TEC153	Tool base of metallurgical enterprises			2/0/1/3	PED435
		TEC104	Drilling machines and complexes			2/0/1/3	PHY112, PED436
		TEC131	Machines and equipment for drilling oil and gas wells at sea			2/0/1/3	PHY112, PED436
		TEC404	Technical audit			2/0/1/3	PHY112
		TEC411	Equipment maintenance system			2/0/1/3	PHY112
	3219	TEC121	Transportation machines	B	6	2/1/0/3	PHY112
		PED141	Drives of metallurgical machines			2/0/1/3	PHY112
		TEC155	Technological processes in the oil and gas industry			2/0/1/3	PHY112, PED436
		TEC156	Technology of drilling wells and oil and gas production			2/0/1/3	PHY112, PED436
		TEC405	Technical aesthetics and ergonomics			2/0/1/3	PED436
		TEC412	Material and technical means of repair work			2/0/1/3	PHY112
	3301	MIN414	Development of mineral deposits	S	6	2/0/1/3	PHY112
		MIN173	Mining technology			1/0/2/3	PHY112
		TEC112	Equipment for ore preparation			2/1/0/3	TEC193
		PED439	Basics of hydraulics and hydraulic drives of technological machines			2/0/1/3	PED436
		PED190	Internal combustion engines			2/0/1/3	PHY112
		TEC414	Technological process of repair			2/0/1/3	PHY112
			Total:		**24**		
			6 semester (spring 2023)				
3	3220	TEC108	Pumps, fans, compressors	B	6	2/0/1/3	PHY112
		PED118	Dust-gas cleaning and recycling water supply of industrial enterprises			2/0/1/3	TEC112
		PED191	Gas-pumping units			2/0/1/3	PED436
		PED192	Gas turbine plants			2/0/1/3	PED436
		TEC413	Ways to restore and repair parts			2/0/1/3	PED436
			Total:		**6**		
			7 semester (fall 2023)				
	4304	TEC177	Drain, fan and pneumatic installations	S	6	2/1/0/3	PHY112
		TEC141	The equipment of metallurgical shops			2/0/1/3	TEC112
		TEC109	Oil and gas field machines and mechanisms			2/0/1/3	PHY112, PED436
		TEC133	Machines and equipment for oil and gas production at sea			2/0/1/3	PHY112, PED436
	4305	MIN416	Burro-blasting works	S	6	2/0/1/3	PHY112
		MIN415	Technology of mine workings			2/0/1/3	PHY112
		PED185	Technical diagnostics of metallurgical equipment			2/0/1/3	TEC180
		TEC127	Hydromachines and compressors in the oil and gas industry			2/0/1/3	PED413, PHY112
		TEC106	Machines and equipment for gas and oil pipelines			2/0/1/3	PED191
		TEC415	Technological equipment of the industry for mechanical processing			2/0/1/3	PHY112

4		TEC406	Non-Destructive Testing and Diagnostic Methods			2/0/1/3	PHY112
	4306	TEC114	Lifting installations	S	6	2/1/0/3	PHY112
		TEC161	Dynamics of metallurgical machines			2/1/0/3	TEC112
		PED170	Calculation and design of drilling equipment			2/0/1/3	TEC104
		PED155	Calculation and design of oil and gas equipment			2/0/1/3	TEC118
		TEC416	Technological processes of preparation of materials for repair production			2/0/1/3	PHY112
		TEC407	Reliability Oriented Maintenance			2/0/1/3	PHY112
	4307	PED417	Automation and calculation of parameters of mining machines and fixed installations	S	6	2/0/1/3	MAT103, GEN101
		PED151	Reliability of metallurgical machines			2/0/1/3	GEN125
		PED161	Operation and repair of oilfield machines and equipment			2/0/1/3	TEC178, TEC104
		PED458	Organization of repair and maintenance of oil and gas machines and equipment			2/0/1/3	PHY112, GEN146
		TEC408	Equipment Reliability Management System			2/0/1/3	PHY112
		TEC417	Technologies for increasing the durability of equipment			2/0/1/3	PHY112
	Total:				24		
	8 semester (spring 2024)						
4	4308	TEC152	Control and measuring equipment	S	6	2/0/1/3	PED413
		PED177	Designing of metallurgical machines			2/0/1/3	TEC141
		PED157	Well overhaul equipment and installations			2/0/1/3	PHY112, GEN146
		PED454	Engineering and well workover technology			2/0/1/3	TEC134
		TEC418	Fundamentals of design of repair enterprises in the industry			2/0/1/3	PHY112
	4309	PED421	Construction of mining transport vehicles and fixed installations	S	6	2/1/0/3	TEC105
		TEC110	Equipment 3-5 redistribution			2/1/0/3	TEC141
		PED193	Instrumentation and automation of technological machines			2/1/0/3	PED413
		PED455	Technical diagnostics and maintenance of oil and gas machines and equipment			2/0/1/3	GEN146, TEC104
		TEC420	Innovative technologies in the practice of maintenance and repair of technological machines			2/0/1/3	PHY112
	4310	TEC123	Internship transport	S	6	2/0/1/3	TEC121
		PED183	Equipment for hydrometallurgical enterprises			2/0/1/3	TEC112
		PED456	Energy-saving equipment and technologies in the oil and gas industry			2/0/1/3	PED192, TEC191
		PED457	Industrial safety in the oil and gas industry			2/0/1/3	TEC130
		TEC419	Management in the planning of work on repair and maintenance of machines			2/0/1/3	PHY112
	Total:				18		

Credits numbers of elective disciplines over the entire period of study	
Cycles of disciplines	Credits
Cycle of general disciplines (G)	12
Cycle of basic disciplines (B)	36
Cycle of special disciplines (S)	48
TOTAL:	96

The curriculum of the specialty is approved by the Rector of Sutbaev University, 15.09.2020.
Decision of the Academic Council Satbayev University. Minutes # 3, dated "15" 09. 2020.

Decision of the Educational and Methodological Board of Satbayev University. Minutes #4, dated "14" 09 2020.

Decision of the Academic Council of the School of Metallurgy and Industrial Engineering. Minutes #3, dated "25" 10 2020.

Head of department TM,T&L **K.K. Yelemessov**

Representative of Specialty council **M.A. Kanatbaev**

6 GRADUATE COMPETENCY FRAMEWORK

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

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

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

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

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

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

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

a. Natural-scientific and theoretical-worldview competencies;

b. Social and personal competencies;

c. General engineering professional competencies;

d. Communicative and IT virtual competencies;

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

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

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

7 COMPETENCY BUILDING PROCESS

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

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

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

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

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

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

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

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

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

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

7.11 Bachelor of the second specialty (Minor) - Qualification awarded by a university if a student exceeds the minimum framework of professional competencies of Designed by: Reviewed: meeting of the Institute Approved by: EMC KazNRITU Page 18 of 124 a graduate for credits of theoretical study in another educational program with a diploma according to section 8.

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

8 COMPETENCIES ACQUIRED BY STUDENTS IN THE DEVELOPMENT OF THE EDUCATIONAL PROGRAM "6B07107 - OPERATIONAL AND SERVICE ENGINEERING "

General cultural competencies (GCC)	
GCC-1	Ability to communicate verbally and in writing in the state, Russian and foreign languages for solving problems of interpersonal and intercultural interaction
GCC-2	Understanding and practical use of the norms of a healthy lifestyle, including prevention, the ability to use physical culture to optimize performance
GCC-3	The ability to analyze the main stages and patterns of the historical development of society for the formation of a civic position
GCC-4	The ability to use the basics of philosophical knowledge to form a worldview
GCC-5	The ability to critically use the methods of modern science in practice
GCC-6	Awareness of the need and the acquisition of the ability to learn independently and improve their skills throughout their working lives
GCC-7	Knowledge and understanding of professional ethical standards, proficiency in professional communication techniques
GCC-8	The ability to work in a team, tolerantly perceiving social, ethnic, religious and cultural differences
GCC-9	The ability to use the basics of economic knowledge in various fields
General professional competencies (GPC)	
GPC-1	The ability to acquire new knowledge with a high degree of independence using modern educational and information technologies
GPC-2	Possession of computer skills with basic programming sufficient for professional activities
GPC-3	Knowledge of the basic methods, methods and means of obtaining, storing, processing information, the ability to use modern technical means and information technologies using traditional storage media, distributed knowledge bases, and information in global computer networks to solve communicative problems
GPC-4	Understanding the essence and importance of information in the development of modern society, the ability to receive and process information from various sources, the willingness to interpret, structure

	and format information in an accessible form for others
GPC-5	The ability to solve the standard tasks of professional activity based on information and bibliographic culture using information and communication technologies and taking into account the basic requirements of information security
Professional competencies (PC)	
PC-1	The ability to systematically study scientific and technical information, domestic and foreign experience in the relevant training profile
PC-2	The ability to participate in the preparation of scientific reports on the assignment and implement the results of research and development in the field of technological machinery and equipment
PC-3	The ability to participate in work on innovative projects using basic research methods
PC-4	The ability to simulate technical objects and technological processes using standard packages and computer-aided design tools, the willingness to conduct experiments according to specified methods with processing and analysis of the results
PC-5	Possession of approaches and methods of critical analysis, the ability to practically use them in relation to various forms and processes of technological processes
PC-6	The ability to independently master new equipment, technological and technical documentation, make adjustments to it in relation to operating conditions
PC-7	The ability to take part in the calculation and design of parts and assemblies of technological machines in accordance with technical specifications and using standard design automation tools
PC-8	The ability to conduct patent research in order to ensure patent purity of new design solutions and their patentability with the definition of indicators of the technical level of designed products
PC-9	The ability to research and optimize the operating modes of technological machines during their operation
PC-10	The ability to conduct a preliminary feasibility study of design decisions
PC-11	The ability to design technical equipment for workplaces with the placement of technological equipment, the ability to master the input equipment
PC-12	The ability to participate in refining and mastering technological processes during the preparation of new products, to verify the quality of

	installation and commissioning during testing and commissioning of new product samples, assemblies and parts of manufactured products
PC-13	The ability to check the technical condition and residual life of technological equipment, organize routine inspection and maintenance of technological machines and equipment
PC-14	The ability to take measures to prevent occupational injuries and occupational diseases, to monitor compliance with environmental safety of the work
PC-15	The ability to choose basic and auxiliary materials, methods for implementing technological processes, apply advanced methods of operating technological equipment
PC-16	Own the basic methods of calculating the parameters of technological equipment, the methodology for their selection from directories and catalogs.

Matrix of competencies of the educational program “6B07107 - Operational and Service Engineering»

Discipline index	Name disciplines	General cultural									General professional competencies					Professional competencies															
		GCC -1	GCC -2	GCC -3	GCC -4	GCC -5	GCC -6	GCC -7	GCC -8	GCC -9	GPC-1	GPC -2	GPC -3	GPC -4	GPC -5	PC-1	PC -2	PC -3	PC -4	PC -5	PC -6	PC -7	PC -8	PC -9	PC -10	PC -11	PC -12	PC -13	PC -14	PC -15	PC -16
Mandatory component																															
LNG 105	English	x						x								x	x														
LNG 101	Kazakh (Russian) language	x						x								x	x														
MAT100	Algebra and beginning of mathematical analysis						x						x	x			x														
MAT101	Mathematics I						x										x														x
MAT101	Mathematics I						x										x														x
MAT101	Mathematics I						x										x														x
HUM113	Contemporary history of Kazakhstan			x			x																								
PHY110	Introduction to Physics												x	x		x	x														x
PHY111	Physics I																x														x
PHY112	Physics II																x														x
TEC193	Introduction to specialty					x	x	x	x	x						x	x						x								
PED438	System design documentation						x									x	x					x									x
TEC178	Construction materials of technological machines and equipment																x			x		x							x	x
CSE174	Information and communication technology(eng)										x	x	x	x	x	x	x					x			x						x
PED413	Interchangeability, standardization and technical measurements																					x					x	x			x
GEN146	Теоретическая и прикладная механика																					x						x			x
MAT126	Обыкновенные дифференциальные уравнения MatLab																x										x				x
HUM124	Philosophy				x				x					x	x	x															

Discipline index	Name disciplines	General cultural									General professional competencies					Professional competencies														
		GCC -1	GCC -2	GCC -3	GCC -4	GCC -5	GCC -6	GCC -7	GCC -8	GCC -9	GPC-1	GPC -2	GPC -3	GPC -4	GPC -5	PC-1	PC -2	PC -3	PC -4	PC -5	PC -6	PC -7	PC -8	PC -9	PC -10	PC -11	PC -12	PC -13	PC -14	PC -15	PC -16
PED435	Welding and cutting of metals																			x							x	x			
PED436	Термодинамика, теплопередача и теплотехническое оборудование																							x			x	x			
MAT127	Уравнения в частных производных. MatLab																x														x
AUT146	Basics of automation																			x				x							
TEC179	Installation and exploitation of technological machines																							x			x	x	x		
TEC180	Repair of technological machines																							x			x	x			
Elective courses																															
TEC169	Drives of mining machines and fixed installations																				x			x			x	x			
PED430	Technique of field experiment					x										x	x	x					x								
TEC148	Fuels, oils and special liquids																			x							x	x			
PED414	Friction and wear																			x							x	x			
PED114	Computer-aided design of technological machines																		x			x	x								
TEC118	Calculation and design of technological machines and equipment																		x		x	x	x		x						x
MIN407	Open-cast mining technology																			x										x	
PED175	Auxiliary transport equipment of metallurgical workshops																				x			x		x	x	x	x		
PED445	Fundamentals of Research and Development					x										x	x	x	x				x								
TEC105	Mining machines and equipment																				x			x			x	x			
TEC153	Tool base of metallurgical enterprises																				x			x			x	x	x		
TEC104	Drilling machines and complexes																				x			x			x	x			
TEC131	Machines and equipment for drilling oil and gas wells at sea																				x			x			x	x			

Discipline index	Name disciplines	General cultural									General professional competencies					Professional competencies														
		GCC -1	GCC -2	GCC -3	GCC -4	GCC -5	GCC -6	GCC -7	GCC -8	GCC -9	GPC-1	GPC -2	GPC -3	GPC -4	GPC -5	PC-1	PC -2	PC -3	PC -4	PC -5	PC -6	PC -7	PC -8	PC -9	PC -10	PC -11	PC -12	PC -13	PC -14	PC -15	PC -16
TEC121	Transportation machines																				x			x			x	x	x	
PED141	Приводы металлургических машин																				x			x			x	x			x
TEC155	Technological processes in the oil and gas industry																			x									x	
TEC156	Technology of drilling wells and oil and gas production																			x									x	x	
MIN414	Development of mineral deposits																			x						x				x	
MIN173	Mining technology																			x						x				x	
TEC112	Equipment for ore preparation																				x			x		x	x	x			x
PED190	Internal combustion engines																				x			x			x	x			x
PED439	Basics of hydraulics and hydraulic drives of technological machines																			x							x	x			
TEC108	Pumps, fans, compressors																			x				x			x	x			
PED118	Пыле-газоочистка и оборотное водоснаб-жение промышленных предприятий																			x				x		x	x	x	x		
PED191	Gas-pumping units																				x			x		x	x	x			
PED192	Gas turbine plants																				x			x		x	x	x			
TEC177	Drain, fan and pneumatic installations																				x			x		x	x	x			

Discipline index	Name disciplines	General cultural									General professional competencies					Professional competencies													
		GCC -1	GCC -2	GCC -3	GCC -4	GCC -5	GCC -6	GCC -7	GCC -8	GCC -9	GPC-1	GPC -2	GPC -3	GPC -4	GPC -5	PC-1	PC -2	PC -3	PC -4	PC -5	PC -6	PC -7	PC -8	PC -9	PC -10	PC -11	PC -12	PC -13	PC -14	PC -15	PC -16
TEC141	The equipment of metallurgical shops																				x			x		x	x	x			x
TEC109	Oil and gas field machines and mechanisms																				x			x		x	x	x			
TEC133	Machines and equipment for oil and gas production at sea																				x			x		x	x	x			
MIN416	Burro-blasting works																													x	
MIN415	Technology of mine workings																			x				x							
PED185	Техническая диагностика металлургического оборудования																			x				x			x	x		x	
TEC127	Hydromachines and compressors in the oil and gas industry																				x			x		x	x	x			
TEC106	Machines and equipment for gas and oil pipelines																				x			x		x	x	x			
TEC114	Lifting installations																				x			x			x	x	x		
TEC161	Dynamics of metallurgical machines																			x							x	x			
PED170	Calculation and design of drilling equipment																				x	x									x
PED155	Calculation and design of oil and gas equipment																				x					x					x
PED417	Automation and calculation of parameters of mining machines and fixed installations																				x	x	x			x					
PED452	Reliability of metallurgical machines																				x	x	x				x	x	x		

Discipline index	Name disciplines	General cultural									General professional competencies					Professional competencies														
		GCC -1	GCC -2	GCC -3	GCC -4	GCC -5	GCC -6	GCC -7	GCC -8	GCC -9	GPC-1	GPC -2	GPC -3	GPC -4	GPC -5	PC-1	PC -2	PC -3	PC -4	PC -5	PC -6	PC -7	PC -8	PC -9	PC -10	PC -11	PC -12	PC -13	PC -14	PC -15	PC -16
PED161	Operation and repair of oilfield machines and equipment																							x			x	x	x		
PED458	Organization of repair and maintenance of oil and gas machines and equipment																							x		x	x	x	x		
TEC152	Control and measuring equipment																					x		x		x					
PED177	Designing of metallurgical machines																					x	x		x	x					x
PED157	Well overhaul equipment and installations																				x			x		x					
PED454	Engineering and well workover technology																				x					x	x	x	x		
PED421	Construction of mining transport vehicles and fixed installations																					x	x		x						x
TEC110	Equipment 3-5 redistribution																				x			x			x	x			x
PED193	Instrumentation and automation of technological machines																							x		x	x	x			
PED455	Technical diagnostics and maintenance of oil and gas machines and equipment																			x				x		x	x	x	x		
TEC123	Internship transport																				x			x			x	x			
PED183	Оборудование гидрометаллургических предприятий																				x			x			x	x			

Discipline index	Name disciplines	General cultural									General professional competencies					Professional competencies														
		GCC -1	GCC -2	GCC -3	GCC -4	GCC -5	GCC -6	GCC -7	GCC -8	GCC -9	GPC-1	GPC -2	GPC -3	GPC -4	GPC -5	PC-1	PC -2	PC -3	PC -4	PC -5	PC -6	PC -7	PC -8	PC -9	PC -10	PC -11	PC -12	PC -13	PC -14	PC -15	PC -16
PED456	Energy-saving equipment and technologies in the oil and gas industry																				**x**			**x**							
PED457	Industrial safety in the oil and gas industry																										**x**		**x**		
State final certification																															
ECA101	Preparation and writing of the thesis (project)	**x**	x	x	x	x	x	x	x	x	x	x	x	x	x	**x**	**x**	**x**	**x**	x	x	x	x	x	x	x	x	x	x	**x**	x
ECA102	Protection of the thesis (project)																														
Additional types of training																															
AAP106	Physical education I, II		**x**						**x**																						
AAP101	Internship						**x**		**x**	**x**																					
AAP109	Industrial internship I						**x**		**x**																						
AAP103	Industrial internship II						**x**		**x**																						

9 MINOR CONTINUING EDUCATION POLICY

When mastering at least 24 credits in the disciplines of the program, including the following mandatory disciplines:

M1 - Theory of welding processes - 6 credits.

M2 - Equipment and technology of fusion welding - 6 credits.

M3 - Welding materials - 6 credits.

M4 - Maintenance and service work in the welding industry - 6 credits. An additional Minor specialty is assigned with the issuance of an application to the diploma of the established sample.

10 ECTS DIPLOMA SUPPLEMENT

The application is developed according to the standards of the European Commission, Council of Europe and UNESCO / CEPES. This document is for academic recognition only and does not constitute official proof of education. Without a diploma of higher education is not valid. Purpose of filling European application - the provision of sufficient data on the holder of the diploma, his qualifications, 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, which will be used for the transfer of estimates, the European system of transfer or credit transfer (ECTS) is used.

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

Bachelor of Engineering and Technology, 6 level of the national qualifications framework with the right to work engineer, mechanical engineer at the enterprises of mining and metallurgical, oil industry and welding production (levels 5-8) according to the order of the deputy. Chairman of the Board of the National Chamber of the Republic of Kazakhstan "Atameken" No. 239 dated September 6, 2018

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

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

DIPLOMA SUPPLEMENT
_____

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

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

11 SHORT COURSE DESCRIPTION

Algebra and beginning of mathematical analysis
CODE - MAT00120
CREDIT - 6 (1/0/2/3)
REQUISIT - diagnostic test
PURPOSE AND TASKS OF THE COURSE
The purpose of the course is to acquaint students with the basic ideas and concepts of algebra and mathematical analysis and the formation of the basic knowledge necessary for studying the course "Mathematics 1".
Course objectives - the formation of skills for the study of mathematical disciplines and the effective use of mathematical methods for solving research and practical problems in the professional field.
BRIEF DESCRIPTION OF THE COURSE
The course "Algebra and Introduction to Analysis" gives the basic concepts of algebra, mathematical analysis, differential and integral calculus.
KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE
Student must
know:
- The basic concepts of algebra;
- The basic concepts of mathematical analysis;
- basic elementary functions; should be able to:
- find solutions to equations and inequalities, systems of equations and inequalities;
- convert algebraic and trigonometric expressions;
- solve text problems;
- find the derivative of elementary functions;
- investigate functions using a derivative;
- find indefinite integral of elementary functions;
- find a definite integral;
- find the area of a curvilinear trapezoid.

Math I

CODE - MAT00121

CREDIT - 6 (1/0/2/3)

REQUISIT - Elementary School Mathematics / Diagnostic Test

PURPOSE AND TASKS OF THE COURSE

The main goal of the course is to provide the future specialist with a certain amount of knowledge in the sections of the "Mathematics-I" course, which is necessary for studying related engineering disciplines. Introduce students to ideas and concepts of mathematical analysis. The main attention is paid to the formation of basic knowledge and skills with a high degree of their understanding of differential and integral calculus.

Course objectives:

the acquisition of knowledge necessary for the effective use of rapidly developing mathematical methods; obtaining the skill of building and researching mathematical models; possession of the fundamental sections of mathematics necessary for solving research and practical problems in the professional field.

BRIEF DESCRIPTION OF THE COURSE

In the course "Mathematics-I", the following sections are presented: introduction to analysis, differential and integral calculus

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

The study of this discipline will allow the student to apply the "Mathematics-I" course to solving simple practical problems, to find tools sufficient for their research, and to obtain numerical results in some standard situations.

Math II

CODE - MAT00122

CREDIT - 6 (1/0/2/3)

REQUISIT - Mathematics 1

PURPOSE AND TASKS OF THE COURSE

The purpose of teaching the course "Mathematics II" is to form the bachelor's ideas about modern mathematics as a whole as a coherent system of theoretical knowledge. **The objectives of the course** are to instill in students solid skills in solving mathematical problems with bringing the solution to a practically acceptable result. Develop primary skills of mathematical research of applied questions and the ability to independently understand the mathematical apparatus contained in the literature related to the student's specialty.

BRIEF DESCRIPTION OF THE COURSE

The course “Mathematics II” provides an accessible exposition of sections: elements of linear algebra and analytic geometry, differential calculus of functions of many variables, multiple integrals. “Mathematics II” is a logical continuation of the “Mathematics I” course.
KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

The study of this discipline will allow to put into practice the received theoretical knowledge and skills with a high degree of their understanding within the sections of the course, to use them at an appropriate level; translate into mathematical language the simplest problems posed in terms of other subject areas; acquire new mathematical knowledge using educational and information technologies; solve applied problems in the field of professional activity

Math III
CODE - MAT00123
CREDIT - 6 (1/0/2/3)
REQUISIT - Mathematics 1, Mathematics II
PURPOSE AND TASKS OF THE COURSE
The purpose of teaching the course "Mathematics III" is the formation of basic knowledge and skills with a high degree of understanding of the sections of the course, helping to analyze and solve theoretical and practical problems. **Course objectives:** instilling in students the skills to independently study educational literature, to carry out probabilistic and statistical analysis of applied problems; development of logical thinking and increasing the general level of mathematical culture.
BRIEF DESCRIPTION OF THE COURSE
The course "Mathematics III" includes sections: theory of series, elements of probability theory and mathematical statistics, and is a logical continuation of the discipline "Mathematics II".
KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE
Student must
know:
- theory of numerical series;
- theory of functional series;
- Fourier series;
- elements of probability theory and mathematical statistics;

should be able to:
- Solve problems in all sections of the theory of series;

- find the probability of events;
- find the numerical characteristics of random variables;
- use statistical methods for processing experimental data;

Introduction to Physics

CODE –PHY110

CREDIT - 6 (1/1/1/3)

Prerequisite - Diagnostic Test

GOAL AND OBJECTIVES OF THE COURSE

The main purpose of teaching the course Introduction to Physics is to form ideas about the modern physical picture of the world and the scientific worldview.

SHORT DESCRIPTION OF THE COURSE

The formation of students' ideas about the modern physical picture of the world and the scientific worldview, as well as the formation of students' knowledge and skills in using fundamental laws, theories of classical and modern physics, in the formation of students' skills in solving typical discipline problems (theoretical and practical educational tasks) from various fields of physics as the basis of the ability to solve professional problems.

KNOWLEDGE, SKILLS, SKILLS FOR COMPLETION OF THE COURSE

- the ability to use knowledge of fundamental laws, theories of classical and modern physics, as well as the use of physical research methods as the basis of a system of professional activity.

Physics I, II

CODE - PHYS111-112

CREDIT - 12 (2/2/2/6)

REQUISIT - diagnostic test / PHYS110-111

PURPOSE AND TASKS OF THE COURSE

The main objective of teaching the course Physics I and Physics II is to form ideas about the modern physical picture of the world and scientific worldview.

BRIEF DESCRIPTION OF THE COURSE

The disciplines of Physics I and Physics II are the basis of theoretical training for engineering and technical activities of graduates of higher technical schools and represent the core of the physical knowledge necessary for an engineer operating in the world of physical laws. The course "Physics 1" includes the following sections: physical fundamentals of mechanics, the structure of matter and thermodynamics, electrostatics and electrodynamics. The discipline "Physics II" is a logical continuation of the study of the discipline "Physics 1", and forms a holistic view of

the course of general physics as one of the basic components of the general theoretical training for bachelors of engineering and technical profile. The discipline "Physics II" includes the following sections: magnetism, optics, nanostructures, fundamentals of quantum physics, atomic and nuclear physics.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

- the ability to use the knowledge of fundamental laws, theories of classical and modern physics, as well as the use of methods of physical research as the basis of the system of professional activity.

Modern history of Kazakhstan

CODE - HUM113

CREDIT - 6 (1/0/2/3)

DECLINE – no

PURPOSE AND TASKS OF THE COURSE

The purpose of the course is to familiarize students of technical specialties with the main theoretical and practical achievements of national historical science on the problems of the history of modern Kazakhstan, a comprehensive and systematic study of the main stages of the formation and development of Kazakhstani society.

- analyze the features and contradictions of the history of Kazakhstan in the Soviet period;
- to reveal the historical content of the foundations of the laws of political, socioeconomic, cultural processes at the stages of the formation of an independent state;
- contribute to the formation of students' citizenship;
- educate students in the spirit of patriotism and tolerance, participation in their people, the Fatherland;

BRIEF DESCRIPTION OF THE COURSE

The course Modern history of Kazakhstan is an independent discipline and covers the period from the beginning of the twentieth century to the present day. The modern history of Kazakhstan is studying the national liberation movement of the Kazakh intelligentsia at the beginning of the 20th century, the creation of the Kazakh Autonomous Soviet Socialist Republic, as well as the process of the formation of a multi-ethnic society. KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

- knowledge of events, facts and phenomena of the modern history of Kazakhstan;
- knowledge of the history of ethnic groups inhabiting Kazakhstan;
- knowledge of the main stages of the formation of Kazakh statehood;

- the ability to analyze complex historical events and predict their further development;
- ability to work with all kinds of historical sources;
- The ability to write essays and scientific articles on the history of the Fatherland;
- ability to operate with historical concepts;
- the ability to lead a discussion;
- skills of independent analysis of historical facts, events and phenomena; - public speaking skills.

Kazakh / Russian language

CODE –LENG101

CREDIT - 8 (0/0/4/4)

REQUISIT - diagnostic test

PURPOSE AND TASKS OF THE COURSE

- to teach students to perceive by hearing statements on famous topics related to home, study, free time;
- understand texts on personal and professional topics containing the most frequent words and phrases;
- be able to have a conversation on everyday topics; describe your experiences; tell your opinion; retell and evaluate the content of the book read, the film seen; - be able to create simple texts on known topics, including those related to professional activities.

BRIEF DESCRIPTION OF THE COURSE

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

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

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

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

The student, on the condition of active organization of work in the classroom and conscientious homework by the end of the first semester, acquires skills and abilities corresponding to the European level A2 (Threshold by ALTE classification), that is, it turns out to be on the threshold of independent language proficiency.

English

CODE - LNG1051-1057

CREDIT - 24 (0/0/12/12)

REQUISIT - diagnostic test / LNG1051-1056

LNG1051

PURPOSE AND TASKS OF THE COURSE

Discipline in English “Beginner English” is intended primarily for learning from scratch. This course is also suitable for those who have only common elementary knowledge of the language. After passing this level, the student will be able to confidently communicate on basic topics in English, learn the basics of grammar and lay a certain foundation that will improve their skills at the next stage of learning English.

Post requisites of the course: Elementary English.

LNG1052

PURPOSE AND TASKS OF THE COURSE

The discipline “Elementary English” is the foundation of learning English, which is aimed at developing students' receptive skills (reading and listening) and productive skills (writing and speaking), analyzing basic knowledge, using and memorizing the main grammatical rules and learning the pronunciation and elementary vocabulary. , as well as the promotion of self-study and critical thinking.

Course Prerequisites: Beginner.

Post requisites of the course: General 1.

LNG1053

PURPOSE AND TASKS OF THE COURSE

The goal of the “General English 1” course is to provide students with the opportunity to gain sufficient knowledge in order to become more free in everyday social and academic conditions. Students work on improving pronunciation, vocabulary and grammar. At this level, the main task will be to consolidate the skills acquired earlier, learn how to make and correctly apply complex syntactic

constructions in the English language, and also to achieve really good pronunciation.
Course prerequisites: Elementary English.
Post requisites of the course: General 2.

LNG1054
PURPOSE AND TASKS OF THE COURSE
The "General English 2" course is designed for students who continue to study "General English 1". The course is focused on the ability to actively use in practice most aspects of the English language, conditional sentences, passive voice phrases, etc. At this stage, the student will be able to maintain a conversation with several interlocutors or express his point of view. The student greatly expands his vocabulary, which allows him to freely express his thoughts in any setting. At the same time, the speech will be replenished with various synonyms and antonyms of familiar words, phrasal verbs and stable expressions.
Course Prerequisites: General 1.
Post requisites of the course: Academic English

LNG1055
PURPOSE AND TASKS OF THE COURSE
The main purpose of the English course "Academic English" is to develop academic language skills. Discipline is a language style that is used in writing academic works (paragraph, abstract, essay, presentation, etc.). This course is designed to help students become more successful and effective in their studies by developing critical thinking and independent learning skills.
Course Prerequisites: General 2.
Post requisites of the course: Professional English.

LNG1056
PURPOSE AND TASKS OF THE COURSE
"Business English" (Business English) is English for business communication, business and career. Knowledge of business English is useful for negotiating and business correspondence, preparing presentations and informal communication with business partners.
Features of training are that it is necessary not only to master the vocabulary, but also to learn new skills: presentation, communication, language, professional.
Course Prerequisites: IELTS score 5.0 and / or Academic English
Post requisites of the course: Professional English, IELTS score 5.5-6.0

LNG1057
PURPOSE AND TASKS OF THE COURSE
The “Professional English” course is designed for B2 + students whose goal is to enhance students' language competence in relevant professional areas. The main objective of the course is to teach students to work with texts, both audio and written, in their specialty. The curriculum is built on the necessary vocabulary (words and terms), often used in English for special purposes. Students will acquire proficiency in English through integrated learning based on content and language, will master vocabulary in order to read and understand original sources with a large degree of independence, and practice various communication patterns and vocabulary in specific professional situations.
Course prerequisites: Business English.
Post requisites of the course: any elective course.

Physical training I, II
CODE – KFK 101, 102
CREDIT – 4 (0/0/2)
PRECONDITION – non
PURPOSE AND OBJECTIVES OF THE COURSE
The course is intended for 1.2 year students of all specialties
As part of the course, the student will master the practical use of the skills of performing the main elements of athletics, sports games, gymnastics and a set of standards for General physical training, including professional and applied physical training or one of the sports, methods of conducting independent physical exercises.
The main knowledge and skills in the field of physical culture and sports will be presented, as well as methods of building and rationing the load during independent classes; methods of compiling complexes of hygienic gymnastics and General development exercises;
The final stage of the course is a multivariate test and / or the implementation of the established standards for General physical, sports and professional applied training.
After completing the course, the student must understand the role of physical culture and a healthy lifestyle; know the basics of physical culture and a healthy lifestyle; possess a system of practical skills and abilities that ensure the preservation and promotion of health, development and improvement of psychomotor abilities and qualities.
KNOWLEDGE, SKILLS and ABILITIES AT the end of the COURSE
Upon completion of the module, students will be able to:
The student must be able to:

- dose the load during recreational and independent physical exercises;
- evaluate the volume and intensity of physical activity, taking into account age and health status;
- use the methods and means of PPFP;
- to use a set of exercises on OFP, SFP and include sports and outdoor games, national games.

At the end of the course, the student should know:
- the purpose and objectives of physical training;
- content of training sessions;
- rules for building and rationing the load during independent classes; - rules and methods of drawing up complexes of hygienic gymnastics and General developmental exercises;
- orientation of professional and applied physical training;
- sets of exercises on OFP, SFP and the content of games used in practical

Social & Political Knowledge

CODE - HUM126

CREDIT - 8 (4/0/0/4)

DECLINE – no

This course involves the study of four scientific disciplines - psychology, political science, sociology and cultural studies, each of which has its subject, terminology and research methods. Interactions between these scientific disciplines are carried out based on the principles of information complementarity; integrability; methodological integrity of research approaches of these disciplines; generality of result-oriented teaching methodology; unified system representation of the typology of learning outcomes as formed abilities.

The theoretical sources of this course are the concepts of Western, Russian, and Kazakh scientists in the field of sociology, political science, and cultural studies.

Learning outcomes are defined as a system of formed abilities (competencies) of a certain type. The cognitive type of learning outcomes presupposes the formed ability to demonstrate possession of subject knowledge as the context of its key objects through the interpretation and systematization of their meanings. The functional type of learning outcomes is characterized by the ability to use basic subject knowledge in solving applied problems, to recognize the conflict of interpretations of the same situations by different sources; analyze and evaluate specific situations in various areas of communication (social, political, cultural, interpersonal communication). The systemic type of learning outcomes is characterized by the ability to synthesize in the form of specific products: to make and reasonably present their own decision (assessment, positioning of ideas, individuals, etc.);

create programs aimed at improving or positively developing conflict situations, including in professional activities; produce new knowledge in project activities, evaluate and summarize information in analytical essays, etc. The social (communicative) type of learning outcomes is characterized by the ability to demonstrate and defend their civic and ideological positions in discussions on professional, social, and cultural topics. Expected learning outcomes.

Information and communication technologies (English)

CODE – CSE174

Credit – 6 (2/1/0/3)

PRE - no

THE PURPOSE AND OBJECTIVES OF THE COURSE

- Training in the use of modern information technologies in the field of professional activity. Objectives of the course include:
- reveal the basic concepts of computer systems architecture;
- disclosure of the basic concepts of information and communication technologies and subject terminology;
- learn how to work with software interfaces of operating systems; ○ learn how to work with data in a different view, both tabular structured and unstructured;
- learn how to apply the basic principles of information security;

on expanding the concept of data formats and multimedia content. Learn how to work with typical multimedia data processing applications. Use modern approaches to the presentation of the material; ○ reveal the concepts of modern social, cloud and email platforms and ways to work with them

- trained to use the methods of algorithmization and programming for solving problems of automation of business processes

BRIEF DESCRIPTION OF THE COURSE

The course contains a training program aimed at leveling the basic knowledge of students in the field of information and communication technologies. It contains a full range of topics, according to the standard curriculum of SES, with a predominance of education of practical skills of working with data, algorithmization and programming. The course is designed to teach students not only the basic concepts of architecture and modern infrastructure of information and communication technologies, but also to learn how to use these tools to solve problems of an applied nature. To teach to optimize processes, to apply adequate models and methods of solving practical problems using modern methods and tools of information technology, to automate routine processes, to be productive and effective.

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE
Students will know:
• A computer device;
* Architecture of computing systems;
* Information and communication technology infrastructure;
* Interfaces of modern operating systems;
* Modern tools for working with data of different nature and purpose;
* Types of information security threats, principles, tools and methods of data protection;
• python programming language.
Students will be able to:
* Work with interfaces of modern operating systems;
* Work with modern application software to work with data of different nature and purpose;
* Application of modern social, cloud, email platforms for business processes;
* Programming in algorithmic programming language;
* Analysis, modeling, design, implementation, testing and evaluation of information and communication technology systems

Basics of automation
CODE – AUT146
CREDIT – 6 (2/1/0/3)
PREREQUISITE – PHY111
PURPOSE AND OBJECTIVES OF THE COURSE
The aim of the course: students receive a presentation about the organizational-technical and economic prerequisites for process automation; the requirements to automation systems; learn how to use the model of the system and the scheme of management General objects of textile and light industry; have experience of analysis of production facilities and equipment of automation objects, as well as all automation systems in General.
Objectives: to acquaint students with the goals and objectives of the course "Fundamentals of automation", with examples of automation of production processes; to show the role of computers in automation of production processes; to continue the formation of General and professional competences, interest to the chosen profession, creative attitude to work, self-reliance of students; to promote the development of skills to define goals and priorities in the process of learning.
BRIEF DESCRIPTION OF THE COURSE
The discipline studies the main measuring devices, primary converters (sensors) of technological parameters, actuators, microcontrollers and automatic control systems

of machines and technological equipment. Describes elements of automation systems, time and frequency characteristics of typical links, criteria for studying linear systems for stability, and methods for evaluating the quality of the process.
KNOWLEDGE, ABILITIES, SKILLS AT THE END OF THE COURSE
As a result of studying this discipline, students must:
have an idea of: modern methods and means of automated process control; General trends and principles of development of automation of production processes;
know: the basics of automation of production processes, the device and the principle of operation of automation equipment used in industry and developed; methods of analysis and synthesis of automated control systems;
be able to: navigate the automation schemes of various technological processes, select the necessary and appropriate modern automation equipment, using reference books and catalogs;
acquire practical skills: logical analysis of typical schemes of automated process control and their technical diagnostics.

Philosophy
CODE – HUM124
Credit – 6 (1/0/2/3)
PRE – Modern history of Kazakhstan
THE PURPOSE AND OBJECTIVES OF THE COURSE
The aim of the course is the formation of cognitive, operational, communicative, selfeducational competencies to solve problems:
* contribute to the development of adequate worldview in the modern world;
* to form creative and critical thinking among students;
* to distinguish between the ratio of spiritual and material values, their role in human life, society and civilization;
* contribute to the definition of their attitude to life and the search for harmony with the world.

BRIEF DESCRIPTION OF THE COURSE
"Philosophy" is the formation of a holistic worldview that has evolved in the context of the socio-historical and cultural development of mankind. Introduction to the basic paradigms of the methodology of teaching philosophy and education in the classical and post-classical traditions of philosophy. Philosophy aims to develop a sustainable life goals, finding the meaning of his existence as a special form of spiritual production. Contributes to the formation of the moral image of the individual with the ability of critical and creative thinking. The theoretical sources of this course are the concepts of Western, Russian, Kazakh scientists on the history and theory of philosophy

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

* knowledge of basic terms, main concepts and problems of philosophy;
* knowledge of the main philosophical ways of solving ideological issues in the context of culture;
* ability to analyze the history of philosophical thought;
* the ability to determine alternative ways of setting and solving worldview issues in the history of human development;
* ability to identify the main theoretical approaches in the relationship of man with society;
• the ability to control the method of doing the work;
* search skills systematization of the material; * ability to freely debate and make rational decisions; * * skills of ethical principles in professional activities.

Ordinary differential equation. MatLab

CODE-MAT00126

Credit – 6 (1/0/2/3)

PRE – mathematics I-III

THE PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the course " Ordinary differential equations. Matlab " is the formation of basic knowledge on the sections of the course, helping to analyze, model and solve theoretical and practical problems both analytical and numerical methods using Matlab; instilling in students the ability to independently study the educational literature.

The objectives of the course are to learn to recognize the types and forms of integrable equations and systems, to integrate them and to apply differential equations for mathematical solutions of applied problems.

BRIEF DESCRIPTION OF THE COURSE

Ordinary differential equations of the 1st order.Ordinary differential equations of higher orders. Differential equations system. Linear equations with variable coefficients. Numerical integration of differential equations and systems. Using Matlab for numerical solution of differential equations.

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

- to master the methods of solving ordinary differential equations;
- set mathematical tasks;
- be able to build mathematical models;
- be able to solve problems modeled by differential equations using both analytical and numerical methods using Matlab

Partial Differentiation equations. MatLab

CODE-MAT00127

Credit – 6 (1/0/2/3)

PREREQUISITES-mathematics I-III

THE PURPOSE AND OBJECTIVES OF THE COURSE

The aim of the teaching course "Differential equations in partial derivatives. Matlab."it is the formation of basic knowledge on the sections of the course, helping to analyze, model and solve theoretical and practical problems.

Course objectives: to apply the theory of partial differential equations to solve and study applied problems in various fields of natural science, Economics, medicine, biology and ecology; to form ideas about the implementation of numerical methods for solving boundary value problems using Matlab=

BRIEF DESCRIPTION OF THE COURSE

Basic equations of mathematical physics. Classical boundary value problems for partial differential equations. Analytical and numerical methods for solving classical boundary value problems. Using Matlab for numerical solution of boundary value problems.

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

- to master this mathematical apparatus, which allows to analyze, model and solve classical boundary value problems;
- to master the methods of solving classical boundary value problems;
- to be able to pose a problem, to choose methods of solution, both in analytical form and with the use of computer technologies;
- use modern software-Matlab package;
- to master the methodology and skills of numerical implementation of the mathematical model, analysis of the results, their interpretation to Refine the model; - independently expand their mathematical knowledge.

Introduction to the specialty

CODE-TEC193

Credit – 6 (2/0/1/3)

Prerequisites: none

THE PURPOSE AND OBJECTIVES OF THE COURSE

this is the development of the future specialist ideas about the basics of oil and gas Geology, drilling oil and gas wells, production, processing, transportation of oil and gas, machinery and equipment used in the oil and gas industry

BRIEF DESCRIPTION OF THE COURSE

special discipline that forms the professional knowledge of students of the specialty. The program is focused on the training of mechanical engineers and is aimed at indepth study of the basics of oil and gas business, based on the study of international experience. The objectives of the discipline is to obtain in-depth knowledge in the field of professional activity

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

students acquire knowledge that allows them to independently solve engineering problems, determine the level of technology used in scientific institutions and in the production sphere on the basis of patent and scientific and technical information.

Engineering and Computer Graphics

CODE – GEN101

Credit – 6 (1/0/2/3)

Prerequisites: none

PURPOSE AND OBJECTIVES OF THE COURSE

Acquisition of skills in working with graphic design systems, acquisition of skills in the field of creating and reading graphic documentation, allowing you to study other graphic systems and necessary in subsequent

engineering activities.

BRIEF DESCRIPTION OF THE COURSE

The course develops the following skills in students: to depict all possible combinations of geometric shapes on a plane, to conduct research and their measurements, allowing for image transformation; to create technical drawings, which are the main and reliable means of information that provides communication between the designer and the designer, technologist, Builder. Introduces students to the basics of automated preparation of the graphic part of design documents in the AutoCAD environment.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

A student who has successfully completed the course must:

1. Have an understanding of graphics systems, machine representation, and object creation.

2. To navigate in the field of computer simulation and design of plane and three-dimensional models.

Construction materials of technological machines and equipment

CODE – TEC178

Credit – 6 (2/1/0/3)

PRE: PHY111

The purpose and objectives of the course-the study of the structure, properties and methods of processing of metals, alloys and other structural materials

BRIEF DESCRIPTION OF THE COURSE

The solution of the most important technical problems associated with the creation and development of new, the most economical materials, reducing the weight of machines and devices, improving the accuracy, reliability and efficiency of mechanisms and devices largely depends on the development of materials science and technology of production and processing of materials. This requires further deepening and refinement of knowledge about the relationship of composition, structure and properties of materials, mechanisms of phase transformations and other processes used to control the structure and properties of building materials.

Knowledge and skills at the end of the course, students should acquire knowledge and skills about the structure, physical, mechanical, chemical and technological properties of metals and non-metallic materials, to acquaint students with modern methods of production and technology of processing of structural materials, injection molding, welding and other methods of forming in order to obtain blanks and machine parts

Welding and cutting of metals

CODE-PED435

Credit – 6 (2/1/0/1)

PREREQUISITE: GEN125

THE PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course: the development of students technology of welding and cutting of metals, the scientific foundations of this technology. Enough well and deeply to develop materials, machines and apparatus, mechanization and automation of the welding process. Young professionals should choose the right materials and equipment, be able to use them effectively and competently.

Objectives of the course: the acquisition of students ' skills in the development of metal welding technology, repair of machine parts, surfacing of the surface layer with special physical and chemical properties

BRIEF DESCRIPTION OF THE COURSE

Electric arc welding and cutting, as well as other types of welding are widely used in the metallurgical industry. During installation of metallurgical equipment, repair of

machine parts, pipe laying, production of metal welding and thermal cutting-one of the main technological processes

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

- Theoretical basis of the welding process. The physical nature of an electric arc. - Conditions of static equilibrium of the power supply system - electric arc. Dynamic characteristics of the electric arc.
- Requirements for electric arc power sources.
- The main technological operations of electric arc welding.
- Electric arc welding mode. Determination of welding mode parameters.
- Determination of the parameters of the automatic welding mode.
- Calculation of parameters of manual arc welding with covered electrodes.

Interchangeability, standardization and technical measurements

CODE-PED413

Credit – 6 (2/0/1/3)

PREREQUISITES: GEN125

THE PURPOSE AND OBJECTIVES OF THE COURSE

systematic study of materials on issues of interchangeability related to the regulation of requirements for the size and parameters of typical parts of mechanical engineering. The study of the basic measurements of linear-angular parameters and the acquisition of skills to work with them.

Study of the basic laws and concepts of standardization and interchangeability, the main provisions of the state system of standardization, rationing, methods and means of control of shape deviations, location, roughness and undulation of the surfaces of parts, the role of standardization in improving the quality of machines and the efficiency of their production

BRIEF DESCRIPTION OF THE COURSE

Interchangeability links design, manufacturing technology and product inspection into a single unit. Standardization and unification of parts and elements accelerate and reduce the cost of design and manufacture of products.

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

Know: standardization bodies and services; international standardization; complex systems of General technical standards; the role of standardization in improving the quality of machines and the efficiency of their production

Be able to: use the basic provisions of the state system of standardization; use the basic concepts of interchangeability, systems of tolerances and landings; use of a single system of tolerances and landings (epbo); choose the means of measurement and control of the geometric parameters of parts; to measure linear and angular

dimensions of universal means of measurement; select and calculate the landing in the design of parts; perform the necessary calculations to justify the accuracy of manufacturing parts, based on the requirements for the accuracy of products

Computer-aided design of technological machines

CODE-PED114

Credit – 6 (1/0/2/3)

PREREQUISITE: MAT102, MAT103

THE PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course: to familiarize students with the structure and classification of CAD, with different types of CAD, with the varieties of CAD; study of the theoretical foundations, capabilities and structure of modern computer-aided design (CAD), the ability to use this knowledge in the operation and improvement of CAD *Objectives of the course*: to study the basic principles and provisions of the General theory of computer-aided design; to give in-depth knowledge to students, to prepare specialists for regulatory requirements, to give the skills and ability to use this knowledge in solving engineering problems

BRIEF DESCRIPTION OF THE COURSE

Organization of the process of design of technological objects, the basic principles of construction and structure of CAD, composition and types of CAD, analysis of workflows of technological machines using computers, CAD elements of technological machines. Geometric modeling systems

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

know: technical means and the organization of their use in computer-aided design; on the principles of computer-aided design of machines and technological processes in mechanical engineering; the structure and capabilities of modern CAD *be able to:* be familiar with the various methods of developing a CAD system; to use elements of computer-aided design in solving technological and design problems; to work with CAD products of the company ASCON COMPASS; to work with CAD products AutoCAD Autodesk; to navigate in a wide range of CAD products

Calculation and design of technological machines and equipment

CODE – TEC118

Credit – 6 (1/0/2/3)

PRE: MAT102, MAT103

THE PURPOSE AND OBJECTIVES OF THE COURSE

The design of new advanced technological machines is the basis for the development of this industry, this discipline contributes to the development of

design skills. The study of design stages in solving specific problems, problem statement, construction of a mathematical model of the design object, the choice of the method of solving the problem, the process of solving the problem

*Objectives of the course:*necessary knowledge about the place and role of design processes in the life cycle of the products; applied knowledge in the field of the relationship of technical and economic decisions on the stage of creation of the product, its service or repair

BRIEF DESCRIPTION OF THE COURSE

The concept of the nature and purpose of the mechanism. General principles of technological equipment design. Kinematic scheme of technological machines and equipment, to study the design, methods of calculation and regulation of the clutch parameters, methods of obtaining new technical solutions in the design, construction of gearbox housing parts; typical calculation of mechanical gears

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

to form skills of construction of modeling technologies for solving practical problems; construction of the main elements of mechanical transmission, including the use of computer-aided design

Drives of technological machines

CODE – TEC191

Credit – 6 (2/0/1/3)

PRE: PHY112

THE PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline is to obtain the basics of knowledge in the field of hydraulic – theoretical fluid mechanics in the field of hydraulic and pneumatic actuators used in the oil industry.

The purpose of the discipline-the assimilation of the laws of fluid mechanics, based on the postulates of mechanics of Newton.

Application of knowledge in the field of technical fluid mechanics (hydraulics), for the calculation of hydraulic pressure systems, hydraulic machines, hydraulic and pneumatic actuators, widely used in the oil industry.

Have a presentation:

About what is the science of "mechanics of liquid and gas" and how it is related discipline "Fundamentals of hydraulics and hydraulic drives of technological machines"; on the cognitive and technical value of hydraulics; on the prospects of its development; on methodological problems in hydraulics.

Know: the General laws of hydraulics; the application and importance of hydraulics and hydraulic actuators in the modern oil industry.

Know:
- to formulate and prove the basic laws of one-dimensional fluid and gas flows; - perform self-complete hydraulic calculation of various hydraulic systems, hydraulic and pneumatic drives of oil equipment.

Mining machines and equipment
CODE – TEC105
Credit – 6 (2/0/1/3)
PRE – PHY112
THE PURPOSE AND OBJECTIVES OF THE COURSE
Study of structures and principles of mining machinery equipment, obtaining theoretical knowledge about the methods of calculation and selection of the main parameters of mining machines and their rational use
BRIEF DESCRIPTION OF THE COURSE
Discipline studied pneumatic and hydraulic drilling rigs for drilling holes and wells. We study the theoretical processes and methods of drilling, design and operation. Charging machines and installations. Constructions of loading machines of cyclic and continuous action and excavators. Traction calculations. Machines and complexes for sinking and cleaning works. Studied mining combines and complexes for sinking and cleaning works, as well as machines and equipment for vertical and inclined mine workings and shafts. Get acquainted with the machines for fixing, inspection and maintenance of the roof of mines and workings.
KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE
know: the design of mining machines and stationary plants and the conditions for their effective use; the basics of the theory of transmission of traction by coupling, friction, engagement, vibrations, working environment, etc.; methods of traction and operational calculations of mining machines and plants; the basics of technical and economic calculations characterizing the effectiveness of mining machines and economic and mathematical modeling to establish their optimal parameters; organization and rules of technical and repair maintenance of mining machines and stationary installations; rules and techniques for installation of equipment; methods and organization of work on testing of new samples of mining machines *be able to:* use the methods of solving the problems of determining the basic parameters of mining machines; correctly formulate the basic requirements for mining machines and stationary installations; use reference and information materials; make technical and economic calculations to establish the effectiveness of the GM

Tool base of metallurgical enterprises

CODE – TEC153

Credit – 6 (1/0/2/3)

THE PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the course is to give students the necessary knowledge about the scale of metallurgical production and the continuity of its constituent processes, patterns of construction and trends in the development of technological lines of metallurgical production, necessary for production, design and research activities

BRIEF DESCRIPTION OF THE COURSE

One of the components of the preparation of bachelors-mechanics of metallurgical production is to familiarize them with the basics of the metallurgical process, from enrichment to 3-4 repartitions associated with the processing of metals by pressure. For information about the methods of enrichment and mechanical equipment concentrators, metallurgical processes and the methods of obtaining metals.

KNOWLEDGE AND SKILLS UPON COMPLETION OF THE COURSE

mastering by students of technologies of receiving various metals, beginning with enrichment and finishing with processes of processing of metals by pressure, structures of the existing technological lines and complexes of metallurgical shops and prospects of development of metallurgical production, the principle of the choice of cars and mechanisms, determination of their necessary quantity for lines and complexes of metallurgical shops.

Fuels, oils and special liquids

CODE - TEC148

CREDIT - 6 (2/0/1/3)

PREREQUISITE - PHY112

PURPOSE AND TASKS OF THE COURSE

The purpose of the discipline is to form the future specialist's knowledge of the types of organic fuels, lubricants and technical fluids, their purpose and basic properties. As well as special training of engineering and technical personnel, possessing scientific and practical knowledge in the field of chemotology, since It solves actual engineering and scientific problems in the field of quality, operational properties and rational use of fuels, oils, lubricants and technical fluids.

Tasks of studying the discipline

In order to understand well the work of equipment in the oil and gas industry, to operate them correctly, to be able to establish the causes of malfunctions and designate ways to eliminate them, and even more so in order to design and calculate these systems, you need to have appropriate training in the field of operating

materials. Hence the task of teaching the discipline is to train specialists for design, research and production activities in the field of creation, improvement and operation of systems and mechanisms connected in one way or another with the movement and storage of fuel, oil and special fluids. As a result of studying the course “Fuels, oils and special liquids”, students should master its methods to the extent that is sufficient to solve not only engineering problems, but also to read modern scientific and technical literature.

Having studied the discipline the bachelor should know:

Know:

- working conditions and operational requirements for fuels, lubricants and coolants;
- The main indicators of the quality of fuels, lubricants and coolant; - a systematic approach to the rational use of fuels, lubricants and coolant.

Be able to:

- determine the viscosity index of the oil on the nomogram;
- free to use standards;
- calculate fuel consumption - lubricants and coolant.

Have an idea:

- about the basics of conducting scientific research in the field of fuel, lubricants and special liquids;
- on methods for assessing the quality of fuel, lubricants and special liquids.

Friction and wear CODE

CODE - PED414

CREDIT - 6 (2/0/1/3)

PEREQUISIT - GEN125, GEN104

PURPOSE AND TASKS OF THE COURSE

The purpose of the study: the purpose of studying the discipline is to study issues related to the appointment of machines and equipment overhaul, operating conditions and repair; basic requirements for them; their principles of operation and device; basics of their theory of calculation, design and operation on land. Discipline is one of the main professional training.

The tasks of studying the discipline are mastering the bachelor's theory of friction and wear, methods of improving the wear resistance, reliability and durability of rubbing parts and assemblies of machines; practical skills of calculating and applying the design of the rolling interface, taking into account the type of friction and possible wear, as well as ensuring the optimum mode of operation and maintenance of machines.

Summary: the discipline examines issues related to the appointment of units, equipment and tools workover wells on land; overhaul technology for operating and

maintenance conditions; basic requirements for them; their principles of operation and device; basics of their theory of calculation, design and operation. New technological methods and technical means of repair. Principles of economic operation of modern equipment overhaul wells; modern methods of environmental protection in the overhaul of wells; equipment used in various methods of oil and gas production; equipment for the implementation of processes of influence on the reservoir and its aggregates.

Expected results:

know: the properties of friction surfaces, contact interaction of solids, types of friction, the relationship of friction with vibration, types of lubricants, lubricants and systems; be able to: design friction units, choose materials with the required tribological properties, choose the type of lubricant, lubricants and systems; have skills: determining the characteristics of lubricants, calculating friction for friction and wear, determination of the surface roughness of parts; have an idea: about the technology of manufacturing parts that form friction pairs, about the technologies of surface hardening of rubbing parts, about the methods of friction and wear testing.

Pumps, fans, compressors

CODE - TEC108

CREDIT - 6 (2/0/1/3)

PREREQUISITE - PHY112

PURPOSE AND TASKS OF THE COURSE

Mastering the principle of operation, device, selection and technical maintenance of the operation of technological machines intended for the transportation of liquids gases, as well as gas compression.

BRIEF DESCRIPTION OF THE COURSE

In the discipline under study, questions of the principle of operation of pumps and fans, their design, features of operation, methods of selection and determination of rational parameters of work together with transport pipelines are mastered. We study the theory of gas compression, the design of machines for these purposes - piston, screw and turbo compressors and blowers. The auxiliary equipment and its requirements, the requirements of safety rules and maintenance of pumping, fan and compressor installations are being mastered.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

know: the device of mechanical equipment for transportation of liquids and compression of gases; principle of operation of pumps, fans and compressors. Conditions for the rational and safe operation of equipment.

be able to: calculate and choose the rational type of equipment. Establish an effective mode of equipment operation.

Technological machine drives

CODE - TEC191

CREDIT - 6 (2/0/1/3)

PREREQUISITE PHY112

THE PURPOSE AND TASKS OF THE COURSE The training of a specialist to solve problems related to the design and operation of technological machine drives with complex systems of manual, remote and automatic control of operating modes and positioning of executive bodies.

BRIEF DESCRIPTION OF THE COURSE

Structural diagrams of drives of working bodies, typical solutions. Classification of the working bodies of technological machines according to the nature of the workload. Mechanical and speed characteristics of the drives. Driving sequences.

Hydraulic drive schemes with power from one pump of several consumers (synchronization, power flow distribution, series and parallel connection). Typical schemes of variable speed drives with proportional electro-hydraulic control. Pneumatic drives and machine control systems. The principle of operation and structural diagrams of pneumatic drives of machines. Element base of pneumatic actuators. Schematic diagrams of pneumatic actuators with automatic control. Electric drives and machine control systems. Features of the use of electric drives on technological machines.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

Have an idea: about the systems of hydraulic, pneumatic and electric drives; about the design of drive systems with automatic control. To know: the operating conditions of the drives of technological machines and the loading modes of the drive; principles of operation, device and features of the use of drives and their elements. To be able to: select the type of drive with the desired output characteristics and the method of controlling its parameters; choose the optimal technical and economic parameters of machines with hydraulic, pneumatic and electrical wires.

Technological processes in the oil and gas industry

CODE - TEC155

CREDIT - 6 (2/0/1/3)

PREREQUISITE - MAT102, PHY112, GEN104

PURPOSE AND TASKS OF THE COURSE

The purpose of the study: students mastering the essence of the methods of drilling oil and gas wells both on land and in the waters; mastering the methods of selecting the layout of the drill string by students and mastering the practical skills of its

calculation for various methods of drilling; mastering the methods of dividing the well section into intervals of the same drillability, the principles of choosing a rational type of bit and drilling mode parameters;

Course objectives mastering the methods of detection, prevention and elimination of complications encountered in the process of drilling wells; mastering methods of drilling directional wells, regulating the directions of their wellbore and acquiring practical skills for calculating their profiles; study of factors contributing to the reduction of technical and economic indicators of well construction; compliance with occupational health and safety measures, environmental protection in the process of drilling wells.

Summary: The discipline studies technological schemes of various methods of drilling oil and gas wells, as well as technological schemes of various methods of oil and gas production on land, depending on the type of field. The organization of drilling of oil and gas wells in the fields. The organization of oil and gas in the fields of modern methods of drilling. Fountain, gas-lift and pump extraction technology. Drilling mode Drill string Acquisition and operation of the drill string. Drilling of well and horizontally branched wells.

Complications in the process of drilling wells. Technology of production of oil and gas from several layers. Methods of impact on the well bottom zone. Well testing. The theoretical basis of lifting fluid from the well. Methods to reduce starting pressure gas lift valve. Operation ShSN.

Expected results: the bachelor who studied the discipline should:

know: the mode of operation of oil reservoirs, methods of opening the productive horizons, methods of inflow call and development of wells, methods of influence on the reservoir, methods of impact on the well bottom zone, methods of enhanced oil recovery and intensification of oil and gas production, equipment used in various methods of oil production and gas be able to: know the methods of calculating the main parameters in different modes of operation of deposits, choose the method of opening the productive horizon, calculate the well perforation, choose the flow method and well development, be able to use various charts, graphs and tables when selecting equipment, perform calculations when choosing the method of influence on bottomhole zone, calculate the required amount of reagents when exposed to a CCD, calculate the parameters of the process of maintaining reservoir pressure, to choose equipment.

Technologies of well drilling and oil and gas production

CODE - TEC156

CREDIT - 6 (2/0/1/3)

PREREQUISITE - PHY112, GEN104

PURPOSE AND TASKS OF THE COURSE

The purpose of the study: students mastering the essence of the methods of drilling oil and gas wells both on land and in the waters; mastering the methods of selecting the layout of the drill string by students and mastering the practical skills of its calculation for various methods of drilling; mastering the methods of dividing the well section into intervals of the same drillability, the principles of choosing a rational type of bit and drilling mode parameters;

Mastering the methods of detection, prevention and liquidation of complications encountered in the process of drilling wells; mastering methods of drilling directional wells, regulating the directions of their wellbore and acquiring practical skills for calculating their profiles; study of factors contributing to the reduction of technical and economic indicators of well construction; compliance with occupational health and safety measures, environmental protection in the process of drilling wells. Summary: the discipline studies the technological schemes of various methods of drilling oil and gas wells, as well as technological schemes of various methods of oil and gas production on land, depending on the type of field. The organization of drilling of oil and gas wells in the fields. The organization of oil and gas in the fields of modern methods of drilling. Fountain, gas-lift and pump extraction technology. Drilling mode Drill string Acquisition and operation of the drill string. Drilling of well and horizontally branched wells.

Complications in the process of drilling wells. Technology of production of oil and gas from several layers. Methods of impact on the well bottom zone. Well survey. The theoretical basis of lifting fluid from the well. Methods to reduce starting pressure gas lift valve. Operation ShSN.

Expected results: the bachelor who studied the discipline should:

know: the mode of operation of oil reservoirs, methods of opening the productive horizons, methods of inflow call and development of wells, methods of influence on the reservoir, methods of impact on the well bottom zone, methods of enhanced oil recovery and intensification of oil and gas production, equipment used in various methods of oil production and gas be able to: know the methods of calculating the main parameters in different modes of operation of deposits, choose the method of opening the productive horizon, calculate the well perforation, choose the flow method and well development, be able to use various charts, graphs and tables when selecting equipment, perform calculations when choosing the method of influence on bottomhole zone, calculate the required amount of reagents when exposed to a CCD, calculate the parameters of the process of maintaining reservoir pressure, ti choice of equipment.

Development of mineral deposits

CODE - MIN414

CREDIT - 6 (2/0/1/3)

PREREQUISITE PHY112

PURPOSE AND TASKS OF THE COURSE

The purpose of the discipline is to teach the future specialist - mining engineer the wide use of special methods of blasting, both in underground conditions and on the surface in various mining-geological, mining and cramped conditions. Drawing up plans for emergency response in the underground work environment

BRIEF DESCRIPTION OF THE COURSE

allows you to more deeply study the issues of safe blasting operations and the design of warehouses of explosive materials, which, under production conditions, future specialists will meet often and they will have to resolve these issues. A specific feature of the subject is that it pays more attention to determining the parameters of blasting operations that ensure the safety of blasting operations.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

know: methods of blasting, depending on local conditions, ensuring the safety of blasting operations from the dispersion of pieces of rock mass; ensuring security when storing the VM from lightning.

be able to: determine the parameters of blasting, which can ensure the safety, efficiency and necessary productivity in blasting operations.

Mining technology

CODE - MIN173

CREDIT - 6 (1/0/2/3)

PREREQUISITE - PHY112

PURPOSE AND TASKS OF THE COURSE

mutual arrangement in space of all mine workings, which is a prerequisite for creative study of the issues of opening and preparation of mine fields, development systems for various mining and geological and mining conditions of deposits.

Objectives: the level of mining and the need for them in the national economy; information about mineral deposits and the conditions of their occurrence; ways to develop minerals and prospects for the development of methods; the essence of mining; main elements and their parameters; the essence of underground mining and major mine workings; main production processes and technical and economic indicators of the mines; methods of opening and development of mineral deposits; main technological processes; technical and economic indicators;

BRIEF DESCRIPTION OF THE COURSE

Prospects for the development of underground mining of mineral deposits. Mining and geological characteristics of mineral deposits. Sizes and elements of occurrence of ore deposits. Physico-mechanical characteristics of ores and host rocks. Basic information about mining in underground mining. The order and methods of ore extraction and the sequence of mining blocks. The main indicators of ore extraction. Losses and dilution of ore. Concepts about the mine field, mine. Stages of development of mine fields. Opening of ore deposits. Requirements for opening. Revealing the development of ore deposits. Opening with vertical, inclined trunks, combined methods of opening. Methods of preparation of ore deposits. The main production processes of the clearing recess. The concept and classification of systems for the development of ore deposits. Requirements for them. Systems with open developed space. Development systems with ore mining. Systems with a tab and with fastening. Development systems with the collapse of ore. Combined development systems. Selection of underground mining system

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

know: an idea of mining science and objects of its study; general information about rocks, open, underground mining of mineral deposits; be able to: use the knowledge gained in the study of subsequent special disciplines.

Equipment for ore preparation

CODE - TEC112

CREDIT - 6 (2/0/1/3)

PREREQUISITE TEC193

The purpose and objectives of the course of this discipline is the education and training of mechanical specialists for the production and research activities for the operation, repair and improvement of mechanical equipment for ore preparation

Course objectives for students to learn the basics of calculating machines and equipment for a given discipline. The student must know the purpose, device, work and operating conditions of the equipment under study.

BRIEF DESCRIPTION OF THE COURSE

Classification equipment ore preparation. General information about the process of crushing and grinding. Types of crushing machines. Grinding equipment. Mills classification. Equipment for unloading bulk materials. Equipment for handling bulk materials. Loading cranes. Grab cranes. Equipment for the transport of bulk materials. Pneumatic transport. Hydrotransport, schemes, principle of operation, basic mechanisms. Pulponasosy. Storage equipment for bulk materials. Bins and closures. Equipment for uniform feeding and classification of bulk materials by size. Equipment for sorting bulk materials. Screens, types, device, principle of operation.

Enrichment equipment. Enrichment methods. Equipment for dehydration. Thickeners. Equipment for secondary dehydration. Filter presses. Continuous filters. Batch Preparation Equipment.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

As a result of studying the course, students should know the purpose, structure and principles of work of the equipment under study; theoretical foundations of methods for calculating drives of metallurgical machines and equipment for ore preparation

Thermodynamics and heat transfer in technological processes of the oil and gas industry

CODE - PED444

CREDIT - 6 (2/1/0/3)

PREREQUISITE - MAT102, PHY112

The goal and objective of the course is the assimilation of methods for obtaining, converting the transfer and use of heat, which allows for the operation of technological machines and equipment to save fuel and energy resources, intensify technological processes, identify and use secondary energy resources.

A brief description of the course: The discipline studies the basic concepts and definitions of heat engineering. The first and second law of thermodynamics. Thermodynamic processes of ideal gases. Flow, throttling of gases and vapors. Thermodynamic cycles of heat engines and installations. Heat transfer. Thermal conductivity. Convective heat transfer. Heat transfer in the forced and free flow of fluid. Basics of thermal calculation of heat exchangers.

Expected results:

The student should know:

- Thermotechnical terminology, the laws of obtaining and converting thermal energy, methods of using heat in modern heat engineering installations and technological processes;
- Principles of economic operation of modern heat and power equipment;
- modern ways of protecting the environment from pollution by the combustion products of heat and power equipment;
- thermodynamic properties of real gases and vapors;
- The basic requirements for the rational and safe conduct of operation associated with the use of heat engines.

The student should be able to:

- own the calculated ratios of heat engineering and the skills of rational use of heat in thermal processes;
- to carry out thermal calculations of heat exchangers;

- to solve problems of efficient operation of heat engineering equipment using modern methods of using heat;
- to measure the main thermal indicators related to the profile of engineering activities;
- to solve various applied problems associated with heat engineering calculations in the operation of heat engineering plants and heat engines.

Installation and operation of technological machines

CODE - TEC179

CREDIT - 6 (2/0/1/3)

PREREQUISITE GEN125

PURPOSE AND TASKS OF THE COURSE Acquaintance of students with modern methods and forms of organization of installation works, the technology of assembling units during assembly, alignment of equipment when installed on a foundation, adjustments to standardized units, running in, testing and operating units

BRIEF DESCRIPTION OF THE COURSE

Forms of organization and methods of assembling technological machines and equipment. Rigging, rigging facilities, rigging facilities. Acceptance of foundations for installation of equipment. Geodetic installation support. Ways to install machines on the foundation and installation. Installation of pipelines, mobile cranes, machines for continuous transport. Operational properties of technological machines. Operational properties of the elements of technological machines exposed to temperature, corrosive effects. Lubrication of technological equipment. Lubricating oils.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

Students in practice will be able to apply modern methods and forms of organization of installation work, the technology of assembling units during assembly, equipment alignment when installing on the foundation, adjusting standardized units, run in and test technological machines.

Repair of technological machines

CODE - TEC180

CREDIT - 6 (2/0/1/3)

PREREQUISITE GEN125

THE PURPOSE AND TASKS OF THE COURSE is to prepare students for production and research activities in the field of repair, operation and improvement of equipment for metallurgical production.

Course objectives: is to obtain knowledge on the organization and engineering support of the repair of metallurgical equipment, the technology of restoring worn parts, the ability to identify defects in the nodes of machines and assemblies, instilling in students the practical skills necessary in the repair and operation of equipment of metallurgical production.

BRIEF DESCRIPTION OF THE COURSE

Wear and aging of technological machines and equipment. Design of repair production. Organization and management of the electromechanical service. Major discipline, which includes basic information on methods of repair, improvement of technological equipment.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

know: working conditions and types of wear of process equipment; organization and production of repair of machines and units; technology to restore worn parts; engineering support repair; rules for storage of maintenance materials.

be able to: plan all types of repair of technological equipment; diagnose equipment failures; to make repair and maintenance documentation; put forward and justify proposals for the design of means of mechanization of repair work and modernization of equipment.

Open-cast mining technology

CODE - MIN407

CREDIT - 6 (2/0/1/3)

PREREQUISITE PHY112

PURPOSE AND OBJECTIVES OF THE COURSE Mastering the principles of mining in the open way of mining with the use of various types of mining and transport equipment

General information about open pit mining. Technological production processes in open-cast mines: preparation of rocks for excavation, excavation and loading operations, quarry transport, dumping of overburden rocks, surface recultivation methods. Methods of opening deposits and development systems, elements and classification of development systems, the structure of the integrated mechanization of the development of mineral deposits.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

know: The current state and prospects of development of the mining industries. Technological features of the production of overburden and mining operations at the field with the use of various types of mining and transport equipment.

be able to: Comply with the properties of rocks and the conditions of their development, choose the right opening scheme, field development system, type, size of mining and transport equipment; organize the implementation of basic and

auxiliary processes in accordance with the requirements of the technical operation rules and safety rules.

Auxiliary transport equipment of metallurgical workshops

CODE - PED175

CREDIT - 6 (2/0/1/3)

PREREQUISITE PHY112

PURPOSE AND TASKS OF THE COURSE

The purpose of teaching the course is the preparation of auxiliary technological equipment for work; performing routine maintenance of communications, main and auxiliary process equipment; management of the main and auxiliary process equipment; identify and troubleshoot the main and auxiliary process equipment

Course objectives for students to learn the basics of calculating machines and equipment for a given discipline. The student must know the purpose, device, work and operating conditions of the equipment under study.

BRIEF DESCRIPTION OF THE COURSE

General information about mechano-transport equipment of non-ferrous metallurgy plants. Equipment warehouses bulk materials. Device and design of car dumpers.

Silos and their closures. Feeder Designs

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

be able to: determine the basic parameters of the mechanical mode; choose equipment maintenance techniques depending on its type and purpose.

know: the purpose, device, principle of operation and features of operation of technological equipment of the pyro- and hydrometallurgical industries; signs of properly working equipment; troubleshooting methods.

Fundamentals of Research and Development

CODE – PED445

CREDIT - 6 (2/0/1/3)

PREREQUISITE MAT102, PHY112

PURPOSE AND TASKS OF THE COURSE

The purpose of studying the discipline is to prepare for scientific, technical and organizational and methodological activities related to the conduct of scientific research: the formulation of the problem; organization and conduct of research, including the organization of the work of the research team; registration of research results; evaluation of the effectiveness of the proposals developed and their implementation.

The main tasks are to obtain theoretical knowledge and practical skills for performing scientific research.

BRIEF DESCRIPTION OF THE COURSE

"Fundamentals of research and development work" allows you to gain knowledge of the basic and technological aspects, theoretical positions, technologies, operations, practical methods and techniques of conducting scientific research based on modern achievements of domestic and foreign scientists and master the skills of choosing a scientific research search, analysis, experimentation, data processing, obtaining sound effective solutions using information technologies.

As a result of studying the discipline "Fundamentals of research and development work," the student must: Know and be able to use:

- methodological foundations of scientific knowledge,
- methods of choosing the direction and conduct of scientific research,
- order of registration and presentation of the results of scientific work,
- assess the effectiveness of their implementation,
- basic principles of the organization of the work of the scientific team; - modern methods of design and engineering work.

Fundamentals of the theory of reliability of machines and mechanisms

CODE - PED446

CREDIT - 6 (2/0/1/3)

DETAILED MAT102, PHY112

PURPOSE AND TASKS OF THE COURSE

The goal of the course is to develop students' system of scientific and professional knowledge and skills in the field of creation, maintenance and use of technological equipment - teaching students methods and techniques of purposeful use of knowledge gained in studying fundamental and special courses to solve problems of increasing the efficiency of technological equipment.

Course objectives:

- give the necessary information about the working conditions of oil and gas equipment, which have the greatest impact on its performance;
- obtaining students of theoretical knowledge about the types of wear and causes of failures of oil and gas equipment;
- obtaining students of theoretical knowledge and practical skills in determining the type of equipment wear according to the state of the surface layer;
- to study the methods of testing for wear parts of oil and gas equipment.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE *must know:*

- The basic concepts of the theory of reliability;
- operating conditions of machinery and equipment;
- factors affecting the performance of oil and gas equipment;
- criteria for failures of oil and gas equipment;
- The concept of maintainability of machinery and equipment parts;
- regulatory and technical documentation on the issues of reliability and the development of a system for maintenance and repair of equipment. *should be able to:*
- calculate the timing of the scheduled and capital repairs of equipment;
- develop techniques for bench testing for wear of machine parts and equipment items; - use the basic laws of natural scientific disciplines to describe the physico-chemical processes that occur during wear in the surface layer of oil and gas equipment parts; - determine the nature of loading, operation and wear of friction units of oil and gas equipment;
- develop recommendations for improving the reliability of parts.

Transportation machines

CODE - TEC121

CREDIT - 6 (2/0/1/3)

DIRECT PHY112

PURPOSE AND TASKS OF THE COURSE

The purpose of teaching the discipline is to provide students with knowledge in the field of theory, calculation and operation of transport machines and complexes, necessary for making sound technical and organizational decisions on mine transport in organic connection with related technological processes and mining and technical conditions, taking into account recent advances in transport and underground mining technology

BRIEF DESCRIPTION OF THE COURSE

General information about transport vehicles. Technological schemes of transport. Basics of calculating transport vehicles. Railway transport. Automated system for the design of locomotive transport. Self-propelled transport. Scraper installation. Conveyor installation. Pneumo and hydrotransport installations. Pipeline container pneumatic conveying installations. Mechanization of loading and unloading and installation work. Vehicles on the surface of mines and mines. Technological complex surface.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

know: the design of transport vehicles and installations and the conditions for their effective use; fundamentals of the theory of the transfer of traction force by

coupling, friction, gearing, vibrations, working medium, etc .; methods of traction and operational calculations of transport vehicles and installations; fundamentals of technical and economic calculations that characterize the efficiency of the use of vehicles and economic and mathematical modeling to establish their optimal parameters; basic principles of management and automation of mine vehicles, ensuring their safe and highly efficient operation; organization and rules of technical and repair maintenance of transport vehicles; rules and techniques for installation of equipment; methods and organization of work on the testing of new types of vehicles and equipment; Basics of designing and choosing efficient transport schemes and vehicle interface nodes

be able to: use the methods of solving problems of determining the basic parameters of transport systems; correctly formulate the main requirements for transport vehicles and equipment; use reference and information materials; make technical and economic calculations to establish the effectiveness of the use of vehicles; analyze design solutions and technical achievements in the field of transport machinery and equipment.

Technique of field experiment

CODE - PED430

CREDIT - 6 (2/0/1/3)

TEC193 DISTINGUISHED

PURPOSE AND TASKS OF THE COURSE

The purpose of teaching the course is to provide students with the necessary for further production, activity knowledge about the nature and methodology of conducting scientific research, instrumental design of a full-scale experiment.

BRIEF DESCRIPTION OF THE COURSE

The main stages of scientific research. Work with technical literature. Engineering experiment - the basis of scientific research. Simulation of the objects under study and the principle of similarity. Instrumentation measuring circuits. Preparation of equipment for experimental studies. Calibration of sensors and devices for its implementation. Measurement of torque in shafts using wire converters. Converters and method registers of small linear displacements. Measurement of linear and angular velocities of progressively moving and rotating parts. Determining the scope of the test. Errors experimental research. Evaluation of the accuracy of the results. Processing the results of experimental studies. General rules for maintaining and processing the work log and report

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

The student will be able to independently prepare the equipment for the tensometric studies. Assemble the strain gauge circuit and calibrate using a calibration beam

Drilling machines and complexes

CODE - TEC104

CREDIT - 6 (2/0/1/3)

SPECIFICATION - PHY112, GEN104

PURPOSE AND TASKS OF THE COURSE

The purpose of the study: the study of drilling machines and complexes that provide drilling of deep wells for the extraction of oil and gas from the earth's interior. The program focuses on the training of an engineer mechanic and is aimed at in-depth study of the physical fundamentals of operation of drilling machines and equipment, as well as at designing new drilling equipment based on the existing, developed by global companies, the tasks of studying the discipline is to acquire in-depth knowledge of professional activity.

Summary: the discipline studies modern designs of equipment for drilling wells for the purpose of extracting oil and gas, the device and the main directions of further development of drilling machines and complexes in accordance with the trends of global technical progress; technological and regulatory and technical requirements for drilling machines and installations rules for their installation and dismantling, operation and maintenance. We consider the issues of evaluating the effectiveness of machinery and equipment for choosing a rational method of their operation. The technical level and ways to improve the designs and methods of operation of drilling machines and systems.

Expected results: in accordance with the qualification characteristic of the specialty, the student must:

know: theory, structure and main directions of further development of drilling machines and systems in accordance with the trends of world technical progress; technological and regulatory requirements for drilling machines and complexes; modern advances in related fields of science and technology; modern scientific problems of oil and gas business; teaching methods; psychology of higher education; *be able to:* be able to calculate the technical parameters of drilling machines and installations for a given technological requirements; perform, at the modern technical level, power, strength, kinematic and other engineering and technical calculations of drilling machines; analyze the design and technical and economic indicators of wellknown and designed drilling machines and installations; to design and improve drilling machines, using modern achievements of science and technology; effectively operate drilling machines and installations in various climatic and mining-geological conditions of drilling; solve modern scientific and practical problems in the chosen field of work; successfully carry out research and management activities; process the results of experiments and give them explanations.

Machines and equipment for drilling oil and gas wells at sea

CODE - TEC131

CREDIT - 6 (2/0/1/3)

DYNAMIC PHY112, GEN104

PURPOSE AND TASKS OF THE COURSE

The purpose of the study: The program is focused on the preparation of a bachelor's degree in mechanics and is aimed at studying the physical fundamentals of the operation of drilling machines and equipment used in the drilling of offshore oil and gas wells as well as the principles for designing these machines and the method of their calculation.

Summary: the discipline studies: a variety of conditions for drilling wells from the surface of reservoirs. Machinery and equipment used in drilling for oil and gas in shallow water. Machines and equipment used in the drilling of wells in the coastal shelf. Machines and equipment used in the drilling of wells in the deep water shelf. Machines and equipment used in conditions of sea surface glaciation. Drilling machines and mechanisms for the preparation and injection of cement slurries. The principle of operation of vertical displacement compensators. Underwater wellhead equipment and their management.

Expected results: in accordance with the qualification characteristic of the specialty, the student must:

Know:

- know the theory, structure and main directions of further development of drilling machines and installations in the light of the tasks facing the oil and gas industry; - know the technological and regulatory and technical requirements for drilling machines and installations; *be able to:*
- use drilling equipment and technical means of drilling offshore oil and gas fields; - comply with safety measures, labor and environmental protection in the development of offshore fields;
- be able to calculate the technical parameters of drilling machines and installations according to specified technological requirements;
- be able to perform power, strength, kinematic and other engineering and technical calculations of drilling machines at the modern theoretical level;
- be able to analyze the design and technical and economic efficiency of known and designed drilling machines and installations;
- acquire the skills of designing and further improving drilling machines using modern advances in related fields of science and technology;
- be able to operate drilling machines and installations with the greatest efficiency in different climatic and geological and geological conditions of drilling.

Drives of mining machines and fixed installations

CODE - TEC169

CREDIT - 6 (2/0/1/3)

ADVANCE - GEN146

PURPOSE AND TASKS OF THE COURSE

training specialists to solve problems related to the design and operation of technological machine drives with complex systems of manual, remote and automatic control of operating modes and positioning of executive bodies

BRIEF DESCRIPTION OF THE COURSE

Structural diagrams of drives of working bodies of GM and SU. Classification of the working bodies of technological machines according to the nature of the workload of GM and SU. Mechanical and speed characteristics of the drives. Typical schemes of variable speed drives with proportional electro-hydraulic control. Pneumatic actuators and control systems for GM and SU. The principle of operation and structural diagrams of pneumatic drives GMiSU. Element base of pneumatic actuators. Electric drives and control systems GMISU. The choice of type and parameters of electric motors. The influence of the mode of operation of the mechanism on the output characteristics of the drive. Motor control systems. New and promising elements of the electric drive.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

know: operating conditions of technological machine drives and loading modes of the drive; principles of operation, device and features of the use of drives and their elements.

be able to: choose the type of drive with the desired output characteristics and the method of controlling its parameters; choose the optimal technical and economic parameters of machines with hydraulic, pneumatic and electrical wires

The equipment of metallurgical shops

CODE - TEC141

CREDIT - 6 (2/0/1/3)

TEC112 DIALIZE

PURPOSE AND TASKS OF THE COURSE

To acquaint the metallurgical production mechanics with the main technological equipment, starting with the preparation of the charge for smelting and ending with the equipment for the production of pure metal. For this purpose, the main technological equipment for the production of sinter, iron, steel and equipment for producing zinc, lead and copper are given.

BRIEF DESCRIPTION OF THE COURSE

Machines and units for the preparation of charge materials for blast smelting. Bowl brittle batch. Blast shop. Skip winches. Machines and units of steelmaking. Machines and units of oxygen-converter shops. Melting furnaces. Horizontal converter. Scrubbers. Equipment for casting metals. Rotary filling machines. Rotary casting machines for casting zinc. Equipment for fire refining of copper.
KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE
In the process of studying the material of the discipline, students should have a general understanding of the technological equipment of metallurgical production, the design

Internal combustion engines
CODE - PED190
CREDIT - 6 (2/0/1/3)
ADVERTISING - GEN104
PURPOSE AND TASKS OF THE COURSE
The purpose of the study: the study by students of the design of internal combustion engines used in the oil and gas industry, the theory of working processes, the principles of their work, the basic concepts and definitions, technical and economic indicators, engine system designs, the rules of their technical operation, maintenance and repair.
Summary: in the discipline thermodynamic cycles of ICE are studied. The main technical and economic indicators and characteristics of the engine. Mixing in ICE. Workflows and the basics of their calculation. The processes of compression, combustion and expansion. Calculation of parameters of the working mixture in these processes. External heat balance ICE. Engine designs. Basics of ICE. Fuel equipment and engine regulators. ICE systems: gas exchange, cooling, lubrication, pressurization and engine starting systems. Gas engines. Control systems, control and protection of internal combustion engines. Technical operation of the engine. Technical diagnostics ICE. Product toxicity and environmental protection.
Expected results: the bachelor who studied the discipline should:
know: the basic laws and equations of the processes of mixture formation, combustion, gas exchange and heat exchange in reciprocating internal combustion engines; key performance indicators of the engine; the influence of various factors on the performance of the process, including the formation of toxic components in the exhaust gases; trends and prospects for the development of ICE; *be able to*: calculate the operating modes of the engines, using the methods of calculation and mathematical modeling of the actual cycle and build the characteristics of the engines.

Gas pumping units

CODE - PED191

CREDIT - 6 (2/0/1/3)

SPECIFICATION - MAT102, PHY112

The purpose and objective of the course: The purpose of studying the discipline is to prepare students for solving practical problems related to the calculation of the main parameters and operation of gas pumping units (HPA) used in the oil and gas industry (especially at compressor stations of main gas pipelines).

Brief course description: The discipline studies the main features and the current state of pipeline transportation of natural gas. Modes and performance of gas pumping units at compressor stations. Technological schemes and schemes for the inclusion of HPA at the COP. Features of the properties and aerodynamics of flows in HPA. The relationship of the COP gas pipeline and GPU. Used in the gas industry types of centrifugal feeders. Constructions and characteristics of the Central Natural Gas Center. Shaft sealing systems TSN. Methods for determining the technical condition and power consumption of gas pumping units with power transmission (GTU).

Expected results:

The student should know:

- Modes and performance indicators of gas pipelines at compressor stations, as used as an energy drive (HPA);
- Features of the use of HPA during operation at the compressor station, the nature of the change in the pipeline capacity during the year;
- centrifugal blowers of natural gas of their design and characteristics;
- HPA constructive schemes and characteristics of their principle of operation, purpose, types, structure and principle of operation;
- tasks and methods of the technical state of HPA in operating conditions.
- equipment for the collection and treatment of oil and gas for transportation.

The student should be able to:

- own the calculated ratios of the main parameters and the skills of rational use of equipment;
- to make a choice of equipment and to own the calculated equations of thermodynamic and basic parameters of gas-pumping units with a gas-turbine drive in various modes;
- to carry out thermal calculations of gas pumping units;
- Solve the problem of efficient operation of gas turbines using modern methods; - to determine the nature of the change in pipeline capacity during the year, the reasons for the reduction in power and efficiency. driven unit solve various applied

problems associated with thermodynamic calculations in the operation of gas turbines.

Gas turbine installations

CODE - PED192

CREDIT - 6 (2/0/1/3)

SPECIFICATION - MAT102, PHY112

The purpose and objective of the course: The purpose of studying the discipline is to prepare students for solving practical problems related to the operation of gas turbine units (GTU) used in the oil and gas industry as well as at compressor stations of main gas pipelines. The task of studying the discipline is to familiarize yourself with the designs and principles of operation of GTUs of various schemes and types, mastering the methods for calculating their parameters, skills for monitoring the basic parameters and operating modes of the unit being carried out, methods for diagnosing units with a gas turbine drive.

Brief course description: The discipline studies the main modes and indicators of the operation of trunk gas pipelines of compressor stations, design schemes and principles of operation of various types of GTU and their characteristics, purpose, methods of technical diagnostics of GTU under operational conditions, energy-saving technologies for operating GTU in the oil and gas industry at compressor stations of main gas pipelines).

Expected results:

The student should know:

- features of the use of gas turbines when drilling oil and gas wells, the nature of the change in throughput;
- centrifugal blowers of natural gas of their design and characteristics; concepts and cycles of gas turbines;
- The concept of a gas turbine and the basic thermodynamic characteristics of the simplest gas turbine plant, with intermediate fuel combustion during expansion, with intermediate air cooling during compression;
- constructive schemes of gas turbines and characteristics of their principle of operation, purpose, types, design and principle of operation of the combustion chamber, types of gas turbines, their design, characteristics, indicators used in the oil and gas industry;
- Ways and methods of utilization of heat from the flue gas of GTU at compressor stations and drilling rigs, schemes of the boiler of utilizer for generating steam or hot water, electricity using heat of flue gases, lubrication system and cooling of GTU; The student should be able to:

- to possess the calculated equations of thermodynamic and basic parameters of gas turbine units in various modes;
- to carry out thermal calculations of gas turbines;
- Solve the problem of efficient operation of gas turbines using modern methods;
- to determine the nature of the change in pipeline capacity during the year, the capacity of the gas turbine plant, the reasons for the reduction in power and efficiency. driven turbine driven unit during operation;
- to solve various applied tasks related to thermodynamic calculations in the operation of gas turbine installations, the calculated ratios of the main parameters and the skills of rational use of equipment

Drainage, fan and pneumatic installations

CODE - PED431

CREDIT - 6 (2/0/1/3)

DIRECT PHY112

PURPOSE AND TASKS OF THE COURSE

Mastering the principle of operation, device, selection and operation of electromechanical equipment, for mine drainage, ventilation and compressed air production

BRIEF DESCRIPTION OF THE COURSE

The discipline studies the device of technologically important and large energy consumers in the mining industry: pumps, fans and compressors of various types, designs, basic parameters and scope of these installations, effective modes of their operation are studied. Practically mastered the methods of design and installation of pumping stations, fan installations of the main ventilation. Piping networks, their device and installation, auxiliary equipment, ensuring efficient and safe operation of pumping, fan and compressor units are being studied.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

know: The ability to determine the operating modes of stationary installations of mines and mines. The ability to calculate and select the most efficient equipment for mine drainage, ventilation and production of compressed air.

be able to: The concept of technical documentation. Knowledge of safety regulations, technological design standards

Gas cleaning and dust collecting equipment of metallurgical workshops

CODE - PED424

CREDIT - 6 (2/0/1/3)

TEC112 DIALIZE

PURPOSE AND TASKS OF THE COURSE
To give students an insight into modern systems for dust removal and recycling of water.
BRIEF DESCRIPTION OF THE COURSE
Industrial dust and gas emissions. Classification of pollutants and emissions. The main characteristics of pollutants and emissions. Preparing for the design of dust removal systems. Study of the object and emission sources. Calculations of the composition and volume of dust emissions. Cooling devices for water recycling systems. Cooling water chillers. Water supply enterprises of ferrous metallurgy. Mines, ore-dressing and agglomerative factories. Water supply of coke and metallurgical plants. Water supply steelmaking shops. Water supply rolling shops. Evaporative cooling of metallurgical furnaces.
KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE
The student will be able to independently select and calculate one or another system and device for gas cleaning and recycling water supply.

Oil and gas field machines and mechanisms
CODE - TEC109
CREDIT - 6 (2/0/1/3)
SPECIFICATION - PHY112, GEN104
The purpose of the study: the study of issues related to the appointment of machinery and equipment for the extraction and treatment of oil and gas, the conditions of operation and maintenance; basic requirements for them; their principles of operation and device; basics of their theory of calculation, design and operation.
Discipline is one of the main professional training.
Summary: the discipline examines general information about the fishing machines. The design of the wellbore completed drilling. Tubing. Equipment wells operated by various methods of extraction. Units of capital and current repair of wells. Equipment and tools for the overhaul and maintenance of wells. Equipment wells for various methods of influence on the reservoir in order to increase its oil recovery. The system of collection and preparation of wells. Equipment for the intensification of oil, gas and condensate; equipment for maintaining reservoir pressure and forcing oil out of productive strata.
Expected results: the bachelor who studied the discipline should:
know: principles of economic exploitation of modern oilfield equipment; modern methods of environmental protection in oil and gas production; equipment used in various methods of oil and gas production; equipment used in various methods of oil and gas production; equipment for the implementation of processes of influence on

the reservoir and its aggregates; equipment for repair work on the well; equipment for the collection and preparation of oil and gas for transportation; *be able to:* own the calculated ratios of the main parameters and skills of rational use of equipment; to carry out the kinematic calculation of the equipment; be able to use charts and equipment characteristics; perform elementary design; make a selection of equipment.

Machines and equipment for oil and gas production at sea

CODE - TEC133

CREDIT - 6 (2/0/1/3)

SPECIFICATION - MAT102, PHY112

The purpose of the study: to familiarize students with the features of the development and operation of oil fields at sea. Have an idea of all technological processes associated with drilling, development and operation of wells at sea. Know all types of hydraulic structures from the project to their installation. Understand the technology and equipment of the main and auxiliary assets involved in the operation of offshore hydrocarbon deposits.

Summary: the discipline studies the classification of the main types of machinery and equipment for oil and gas production at sea; schematic diagrams and designs; equipment requirements; main issues of design, manufacture and operation. Equipment for simultaneous-separate operation of one well of several horizons; equipment for underground repair and well development; equipment for workover and well development; reservoir enhancement equipment; equipment for the intensification of oil, gas and condensate; equipment for maintaining reservoir pressure and forcing oil out of productive strata.

Expected results: the bachelor who studied the discipline should:

know: the principles of the economic exploitation of modern machinery and equipment for the extraction of oil and gas at sea; modern methods of environmental protection in the extraction of oil and gas at sea; equipment used in various methods of oil and gas production at sea; equipment used in various methods of oil and gas production; equipment for the implementation of processes of influence on the reservoir and its aggregates; equipment for repair work on the well; equipment for the collection and preparation of oil and gas for transportation; *be able to:* own the calculated ratios of the main parameters and skills of rational use of equipment; to carry out the kinematic calculation of the equipment; be able to use charts and equipment characteristics; perform elementary design; make a selection of equipment.

Burro-blasting works

CODE - MIN416

CREDIT - 6 (2/0/1/3)

DIRECT PHY112

PURPOSE AND TASKS OF THE COURSE

The purpose of the discipline is to study methods of drilling, understanding the theoretical foundations of the use of explosives, the acquisition by students of the necessary skills in the field of explosive business. blasting techniques.

BRIEF DESCRIPTION OF THE COURSE

Drilling of holes and wells (methods of drilling, machines and mechanisms). Properties and field of application of industrial explosives; main components of industrial explosives; explosion theory; means and methods of initiating charges of industrial explosives. The effect of charge in the environment. Destructive and seismic action of the explosion in the rock mass. Blasting operations during the mine workings, calculation of parameters and drawing up a passport blasting, organization of blasting operations. Safety rules for blasting.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

The student should know: the properties and scope of industrial explosives, be able to design drilling and blasting operations.

know: methods of drilling holes and wells, the properties of modern explosives, methods of blasting, the area of rational use of explosives.

be able to: apply the technology of drilling and blasting operations in the mining industry, calculate the parameters of the explosion, draw up passports for drilling and blasting operations, organize the management of drilling and blasting operations.

Technology of mine workings

CODE - MIN415

CREDIT - 6 (2/0/1/3)

DIRECT PHY112

PURPOSE AND TASKS OF THE COURSE

The purpose and task of studying this discipline is to instill in students the knowledge and skills necessary for an independent creative solution of tasks related to the construction of horizontal and inclined mine workings for various purposes.

BRIEF DESCRIPTION OF THE COURSE

Determination of cross-sectional forms and basic parameters of horizontal and inclined mine workings for various purposes, the study of technological schemes of construction in various mining and geological conditions. Technological operations

during the mine workings (destruction of the rock mass, loading and transportation of the rock mass, fastening of the mine workings), as well as auxiliary production operations. Technical and economic assessment of methods for the construction of horizontal and inclined mine workings.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

The student should be able to independently design and apply the studied technological schemes for the construction of horizontal and inclined mine workings in various mining and geological conditions. Design the shape, the structural dimensions of the cross section of workings, choose the method of fixing workings, as well as develop special parts of the project.

know: the purpose and location of mine workings in space, technological schemes of making workings in various mining and geological conditions; types of temporary supports, lining and technology of their construction; advanced mining and construction equipment and the principle of its work; main and auxiliary processes in the construction of underground structures.

be able to: independently and reasonably design the shape and size of the crosssection of mine workings, choose suitable sinking schemes, equipment and technology for underground mine workings

Basics of maintenance of metallurgical equipment

CODE - PED184

CREDIT - 6 (2/0/1/3)

TEC180 DETAIL

PURPOSE AND TASKS OF THE COURSE

prevention of premature wear by ensuring the operating modes according to the passport or design data, proper lubrication and adjustment, timely detection and elimination of malfunctions, development and implementation of measures for its improvement.

BRIEF DESCRIPTION OF THE COURSE

Classification of equipment defects. Defects and their types. Defect ranking by hazard. The main factors influencing the choice of methods of flaw detection. Flaw detection methods. The main parameters of flaw detection methods and their characteristics: sensitivity, resolution, accuracy of monitoring results, equipment reliability, performance, safety requirements, requirements for the qualification of specialists.

Hydromachines and compressors in the oil and gas industry
CODE - TEC127
CREDIT - 6 (2/0/1/3)
SPECIFICATION - PED413, PHY112
The purpose of the study: is to acquire solid theoretical and practical knowledge on the designs and principles of operation of hydraulic machines and compressors, widely used in the transportation of oil, petroleum products and gas through pipelines. *Summary:* The discipline "Hydraulic machines and compressors in the oil and gas industry" gives the acquisition of solid theoretical and practical knowledge of the designs and principles of operation of hydraulic machines and compressors, widely used in the transportation of oil, petroleum products and gas through pipelines. General schemes of hydraulic machines and compressors. The principle of the volumetric and flow machines. Varieties of hydraulic and compressor machines. Theories of action and characteristics. Areas and features of application, regulation of operating modes. *Expected results:*
- mastering by bachelors of the essence of the concept of hydro-pneumatic and hydropneumatic drives;
- the study of methods for improving the reliability of hydropneumatic machines; -acquisition of skills for determining the trouble-free service life of hydropneumatic machines for various purposes;
- acquisition of skills for the choice of hydropneumatic machines and scheduling of preventive and capital repairs.

Machines and equipment for gas and oil pipelines
CODE - TEC106
CREDIT - 6 (2/0/1/3)
DIRECT PHY112
BRIEF DESCRIPTION OF THE COURSE
Designation and classification equipment of oil and gas pipelines. Equipment, pump stations for transportation of crude oil and petroleum products. Compressor stations for transporting natural gas. Valves and equipment for oil pipelines. Valves and equipment of gas pipelines. Technological scheme of binding equipment pump and compressor stations. Automation and control equipment pump and compressor stations.

Lifting installations CODE
CODE - TEC114
CREDIT - 6 (2/0/1/3)
DIRECT PED191

PURPOSE AND TASKS OF THE COURSE
The purpose and task of teaching the discipline is to study the principles of operation and mechanical equipment of mine lifting installations, methods of their calculation and the choice of rational modes of operation
BRIEF DESCRIPTION OF THE COURSE
The discipline studies the purpose and general arrangement of lifting equipment for transporting people; cargo, mineral and waste rock. We study the purpose and design of lifting vessels of various types, the area of their application. Outlines the information and methods of calculation and selection of ropes, hoists, pile drivers. Practically mastered the method of calculating the elements of the kinematic and dynamic mode of operation of the lifting installation, the choice of electric drive and energy consumption for it.
KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE
Must know:
- basic terms and definitions in the field of lifting installations;
- the design of the main and auxiliary equipment used in lifting installations; -modes of operation of electromechanical lifting equipment; *Should be able to:*
- choose rational equipment that meets the conditions for the development of mineral deposits;
- calculate the rational operating modes of the electromechanical lifting equipment.

Dynamics of metallurgical machines
CODE - TEC161
CREDIT - 6 (2/0/1/3)
DEDICATE PED435
PURPOSE AND TASKS OF THE COURSE
Formation of students' knowledge and skills that provide a creative approach to solving problems, determining the characteristics of operational loads in drives of metallurgical machines and units, assessing the bearing capacity in calculating the average life of parts according to the conditions of strength and wear, calculating dynamic loads (oscillating character in drives of machines and elements constructions and on this basis draw conclusions about the strength and operability of the considered design
BRIEF DESCRIPTION OF THE COURSE
Loads in metallurgical machines and constructions. Methods for determining operational loads. Bearing capacity and limiting states of elements of metallurgical machines. Deterministic methods of strength calculation. Fundamentals of the dynamics of metallurgical machines. Stiffness and compliance of standardized

elements of parts of the machine. Accounting for dissipation parameters in the study of dynamic processes. The method of composing the differential equations of motion of mechanical systems and the calculation of dynamic loads in elastic connections.

Dynamic loads in machines from technological loads. Generalized electromechanical elastic systems of single-motor electric drives and their mathematical models.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

Students will be able to determine the effective loads and voltages, to put into practice a number of accurate and approximate methods for determining the characteristics of operational loads, considering the bearing capacity of parts and structures as a random variable, to be able to calculate the dynamic loads in drives and other parts of metallurgical machines.

Calculation and design of drilling equipment

CODE - PED 170

CREDIT - 6 (2/0/1/3)

RECOVERY - TEC104

The purpose of the study: The purpose and objectives of the discipline is to study drilling machines and systems that provide drilling of deep wells for the extraction of oil and gas from the earth's interior.

Summary: the discipline examines the reliability of the equipment; equipment failures and their characteristics. Calculation and design of pumps. Calculation of pneumatic compensators; effort calculation; determination of efficiency. Loading schedule, stock factors, calculation program for shafts and axes of drilling equipment; method of selecting and calculating rolling bearings for drilling equipment. Kinematic and power analysis of mechanical transmissions. Calculation of drilling structures for stability. Calculation of the strength of casing. Calculation and design of elements of the rig. Calculation and design of the drilling rotor. Calculation and design of the drilling swivel. Calculation and design of the pulley system. Calculation and design of the drawworks.

Expected results:

know:

-the theory, structure and main directions of further development of drilling machines and systems in accordance with the trends of world technical progress; - technological and regulatory requirements for drilling machines and complexes;

- modern achievements in related fields of science and technology;
- modern scientific problems of oil and gas business;
- teaching methods;

-psychology of higher education.

be able to:

- be able to calculate the technical parameters of drilling machines and installations for a given technological requirements;
- perform, at the modern technical level, power, strength, kinematic and other engineering and technical calculations of drilling machines;

-analyze the design and technical and economic indicators of well-known and designed

drilling machines and installations;

-construct and improve drilling machines, using modern achievements of science and technology;

- efficiently operate drilling machines and installations in various climatic and geological conditions of drilling
- to solve modern scientific and practical problems in the chosen field of work; -successfully carry out research and management activities; -work the results of experiments and give them explanations.

Calculation and design of oil and gas equipment

CODE - PED 155

CREDIT - 6 (2/0/1/3)

SPECIFICATION - TEC118

The purpose of teaching the discipline is to study issues related to the general issues of the theory and practice of designing machines and mechanisms and their elements, a feature of designing typical types of oilfield equipment; optimization of equipment design using CAD systems.

Summary: The design of new, sophisticated machines for the oil and gas industry is the basis for the development of this industry, and the discipline “Calculation and Design of Oil and Gas Equipment” being one of the key for preparing bachelors in the specialty 5B072400-Technological Machines and Equipment, promotes the development of design skills.

Expected results: know:

- design problems;
- basic input data for the development of structures;

-the reliability of the equipment;

-metal and rigidity of structures;

- stages of creation or modernization of equipment;
- types of products and stages of development of products of the main production;

-the choice of material parts and limit stresses;

-economic basics of design; *be able to:*

-apply the basic design techniques for the development of parametric series of equipment for oil and gas production.

- own the calculated ratios of the main parameters and the skills of rational use of equipment;
- carry out the kinematic calculation of equipment;
- be able to use the diagrams and characteristics of the equipment;
- perform elementary design;
- in the field of technological processes related industries;
- in the choice of rational modes of operation of field equipment;
- In the field of industrial labor law and safety in the operation of field equipment.

Automation and calculation of parameters of mining machines and fixed installations

CODE - PED417

CREDIT - 6 (2/0/1/3)

SPECIFIC GEN125

PURPOSE AND TASKS OF THE COURSE

gaining knowledge about the basic concepts of object-oriented programming, the concepts of the visual programming environment

BRIEF DESCRIPTION OF THE COURSE

Automation of engineering staff of mining enterprises. The work environment is the workplace of the developer. Basics of programming. Building a user interface. Standard controls. Work with files and organization of printing. Graphics management. Debugging programs, error handling and application optimization.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

know: be able to develop software projects and program using the visual environment of object-oriented programming, taking into account the peculiarities of the language; use visual programming environment *be able to:* create software products using libraries of visual components.

Reliability of metallurgical machines

CODE – PED452

CREDIT - 6 (2/0/1/3)

SPECIFIC GEN125

PURPOSE AND TASKS OF THE COURSE

The purpose of teaching the course is to develop students' knowledge and skills that provide a creative approach to solving the problems of reliability and durability of technological machines and equipment necessary to increase the level of automation, reduce the huge costs of repairing damages from machine downtime, and ensure the safety of people.
The objectives of the course are the study of students: issues of ensuring the reliability and durability of mechanical equipment; principles of rational use of technical parameters of metallurgical machines
BRIEF DESCRIPTION OF THE COURSE
The states and properties of objects in the theory of reliability. Reliability indexes. Interconnection of reliability indicators. Random quantities and their characteristics. Reliability in the period of normal operation. Reliability during periods of wear failures and the combined effect of sudden and gradual failures. Reliability of machines as systems. Fundamentals of calculating the reliability of machines using the methods of mathematical statistics. Reliability of connection with interference. Reliability of rolling bearings. Reliability belt drive. Coupling reliability. The main methods and ways to improve the reliability of machines
KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE
trainees will be able in practice to solve problems of determining the probability of failure-free operation, service life, plan the parameters of an outage schedule.

Operation and repair of oilfield machines and equipment
CODE - PED161
CREDIT - 6 (2/0/1/3)
RECOVERY - TEC178, TEC104
The purpose of the study: the discipline is theoretical and practical training of future specialists - mechanical engineers of oil and gas field equipment on general issues: repairing machines, identifying the type of damage and wear of parts, methods of hardening parts, developing technological processes of repair, choosing repair equipment and organizing repair services for oil and gas enterprises gas industry.
Summary: The discipline studies the rules of technical operation of oil and gas equipment, the system of planned preventive maintenance and repair, as well as the methodology for their development. The management structure and organization of repair facilities, the technology of repairing parts using new restoration methods and hardening. Acquired the ability to select a rational method of operation and repair.
Expected results: the ability to use flaw detectors, machine diagnostics tools, to establish the type of damage and wear of parts; familiarity with the role and importance of repairing machines in improving the operational reliability of

equipment; organization of repair and maintenance of oil and gas machines and equipment

know: knowledge of the types of damage, wear of parts and methods for their recovery; the ability to choose the method of repair and develop the technological process of repairing parts or machines; know the system and the basic rules of repair of machinery and equipment, determine the degree of wear, the rules of acceptance and testing of machines after repair.

Organization of repair and maintenance of oil and gas machines and equipment

CODE – PED458

CREDIT - 6 (2/0/1/3)

SPECIFICATION - PHY112, GEN104

PURPOSE AND TASKS OF THE COURSE

Forms and methods of organizing the maintenance and service of oil and gas equipment, especially the formation and organization of services; basic methods of operation and maintenance of equipment; familiar with the rules of formation of production units, their structure and order of recruitment teams. Organization of production processes of structural units, forms and rules of interaction with thirdparty enterprises, specialization and cooperation in production activities. Knowledge of these features will help the specialist to quickly adapt in practice, master the skills of conducting performance analysis and coordinate the activities of various departments. *Expected results:*

know:

- The basics of designing a system for the maintenance and repair of oil and gas equipment;
- Nomenclature of oil and gas equipment subject to maintenance and repair;
- regulatory documentation on the development of a maintenance and repair system;
- types of maintenance and repair of oil and gas equipment;
- determination of maintainability and manufacturability of maintenance and repair;
- The main indicators of maintenance and repair.

be able to:

- develop methods for the maintenance of oil and gas equipment;
- determine the maintainability of equipment;
- determine the manufacturability during repairs;
- assign the time and amount of repairs;
- determine the technical condition and residual life of the equipment; *own:*
- methods of maintenance of oil and gas equipment;

- practical skills of drawing up documentation for maintenance and repair; - methods for calculating the number of spare parts and materials.

Control and measuring equipment

CODE - TEC152
CREDIT - 6 (2/0/1/3)
DEDICATE PED413
PURPOSE AND TASKS OF THE COURSE
To acquaint students with the main provisions, terms and definitions in the field of measurement and measuring equipment; to choose the right measuring device in accordance with the required accuracy; formulate requirements for measuring equipment; requirements and content of design and technical documentation for the operation of process equipment; electronic and measuring equipment, devices and systems for monitoring production processes; possession of technical control methods in the current production conditions; rational methods of finding and using scientific and technical information
BRIEF DESCRIPTION OF THE COURSE
Measurements and physical quantities. Classification of measurements. Means of measurement. Measurement methods. Measurement of linear quantities and tools. Stroke and end measures of length. Bar tools, micrometric tools. Optical-mechanical measuring instruments, classification. Details and nodes of optical systems. Indicating measuring instruments. Mechanisms and diagrams of devices, their details. Rotating and counteracting moments. Scale equation. Characteristics of accuracy, quality indicators of devices. Temperature measurement and instrumentation. Characteristic of the measured value and classification of measurement methods. Technical thermometers. Thermometers of resistance, thermocouples. Secondary devices to work with them.
KNOWLEDGE, SKILLS TO COMPLETE COURSE
know: select the measurement method; build an information model of the production process; possession of technical control methods in the current production conditions *be able to:* rational methods of searching and using scientific and technical information.

Designing of metallurgical machines

CODE - TEC177
CREDIT - 6 (2/0/1/3)
RECOVERY TEC141
BRIEF DESCRIPTION OF THE COURSE

The concept of "design." Technical task and its analysis. Preliminary design. Development of working documentation. Principles of design. Welded connections. Detailed drawings of parts. General requirements. In connection with the development of technology, the role of designers is growing, each new development requires new, more efficient technical solutions. Research methods and design mechanisms of machines and parts according to the criteria of efficiency.

Drain, fan and pneumatic installations

CODE - TEC177

CREDIT - 6 (2/0/1/3)

RECOVERY TEC141

PURPOSE AND TASKS OF THE COURSE

The purpose of teaching the course is to acquaint students with modern methods of calculating and designing metallurgical machines and equipment, taking into account the operating conditions of the machines. using modern regulatory and technical documentation.

The objectives of the course is to teach students the skills to make the right choice of development, the stages of implementation, consideration and approval of design documentation; methodology of organization and execution of design work; methodology for the design and construction of metallurgical machines and units; organize the execution of works on the design of machines at various stages of development; develop the main types of design documentation for units and parts of metallurgical machines; put into practice modern techniques and methods of calculating the design and construction of machines; to carry out supervision over the implementation of developments in the manufacture, testing and operation

BRIEF DESCRIPTION OF THE COURSE

The concept of "design." Technical task and its analysis. Preliminary design. Development of working documentation. Principles of design. Welded connections. Detailed drawings of parts. General requirements. In connection with the development of technology, the role of designers is growing, each new development requires new, more efficient technical solutions. Design preparation of production is becoming increasingly important in the introduction of new products and largely determines the quality and timing of this implementation. To solve the problem of introducing new technology, the designer must have not only extensive knowledge, but also certain professional qualities

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

- research methods and design mechanisms of machines and parts according to the criteria of efficiency;
- The basis for the development of technical specifications for design;

- Methods for calculating the details and mechanisms of technological machines and equipment components.

Well overhaul equipment and installations

CODE - PED157

CREDIT - 6 (2/0/1/3)

SPECIFICATION - PHY112, GEN104

PURPOSE AND TASKS OF THE COURSE

The purpose of the course is to study issues related to the appointment of machinery and equipment overhaul, operating conditions and repair; basic requirements for them; their principles of operation and device; basics of their theory of calculation, design and operation.

Course objectives: The task of studying the discipline is to develop students' skills to perform calculation and elementary design, as well as to make a choice of equipment and have skills in operation.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE *know:*

- principles of economic operation of modern equipment for workover of wells;
- modern methods of environmental protection in the overhaul of wells;
- equipment used in the overhaul of wells;
- equipment for the implementation of processes of influence on the reservoir and its fillers;
- equipment for repair work on the well;
- equipment for the collection and treatment of oil and gas for transportation.

be able to:

- own the calculated ratios of the main parameters and the skills of rational use of equipment;
- carry out the kinematic calculation of equipment;
- be able to use the diagrams and characteristics of the equipment; - perform elementary design - to make a choice of equipment.

Engineering and well workover technology

CODE – PED454

CREDIT - 6 (2/0/1/3)

SPECIFICATION - PHY112, GEN104

The purpose and objective of the course: The purpose of studying the discipline is to study issues related to the appointment of machinery and equipment overhaul, operating conditions and repair; basic requirements for them; their principles of operation and device; basics of their theory of calculation, design and operation. Brief course description: The discipline deals with issues related to the designation

of aggregates, equipment, and well workover tools; overhaul technology for operating and maintenance conditions; basic requirements for them; their principles of operation and device; basics of their theory of calculation, design and operation. New technological methods and technical means of repair. Principles of economic operation of modern equipment overhaul wells; modern methods of environmental protection in the overhaul of wells; equipment used in various methods of oil and gas production; equipment for the implementation of processes of influence on the reservoir and its aggregates.

Expected results:

know:

- principles of economic operation of modern equipment for workover of wells;
- modern methods of environmental protection in the overhaul of wells; - equipment used in the overhaul of wells on land;
- equipment for the implementation of processes of influence on the reservoir and its fillers;
- equipment for repair work on the well;
- equipment for the collection and treatment of oil and gas for transportation. *be able to:*
- own the calculated ratios of the main parameters and the skills of rational use of equipment;
- carry out the kinematic calculation of equipment;
- be able to use the diagrams and characteristics of the equipment;
- perform elementary design; make a selection of equipment.

Construction of mining vehicles and fixed installations

CODE - PED421

CREDIT - 6 (2/0/1/3)

TEC105 DIALIZE

PURPOSE AND TASKS OF THE COURSE

The purpose and objective of the discipline is to obtain knowledge in the field of design of the construction of mining machines and stationary installations, taking into account the latest advances in mechanical engineering.

BRIEF DESCRIPTION OF THE COURSE

The discipline describes the basic principles, methods of designing mining machines and stationary installations, manufacturability of the structure. Indicators of technological design. Required documents and their registration. The establishment of rational design parameters of mining machines and stationary installations.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE *know:*

- The basic principles and methods of designing technological machines;
- methods for reducing the mass and metal content of the structure;
- principles for calculating design parameters; - designing assembly units and machine parts; *be able to:* find a solution to the same type of design problems in the design of technological machines.

Equipment 3-5 redistribution

CODE - TEC110

CREDIT - 6 (2/0/1/3)

RECOVERY TEC141

GOAL AND TASKS

The purpose of teaching the course of discipline is to prepare a specialist for production, design and research activities in the field of creation, improvement and operation of mechanical equipment of metal pressure shops

The objectives of the course as a result of which the future specialist should know: the purpose, design and working conditions of equipment for metal forming; advantages and disadvantages of certain types of equipment; typical modern designs of machines and mechanisms for rolling mills; prospects and directions of improvement of equipment for metal forming; technical and economic indicators of equipment for metal forming

BRIEF DESCRIPTION OF THE COURSE

Classification of work stands and rolling mills. The parameters of the rolling process. Calculation of rolling force. Moment and power rolling. Determination of power of the electric drive. Workstations Bearings and cushions of rolls. Mechanisms and devices for setting and balancing rolls. Roll balancing devices. Beds of working stands. Drive rolls working stands. Gear stands. Machines and mechanisms for moving rolled products and ingots. Ingot trucks. Continuous hot and cold rolling mills.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

As a result of studying the course, students should know: the purpose, structure, and working conditions of the equipment for metal forming; advantages and disadvantages of certain types of equipment; typical modern designs of machines and mechanisms for rolling mills; prospects and directions of improvement of equipment for metal forming

Instrumentation and automation of technological machines
CODE - PED193
CREDIT - 6 (2/0/1/3)
SPECIFICATION - PED413
The purpose of the discipline is the formation of the future specialist knowledge of the design of instrumentation, their purpose and principles of operation. As well as special training of engineering and technical personnel, possessing scientific and practical knowledge in the field of operation, because It solves relevant engineering and scientific problems in the field of quality, performance properties and rational use of fuels, oils, lubricants and technical fluids.
Tasks of studying the discipline
In order to understand well the work of the equipment of the oil and gas industry, to operate them correctly, to be able to establish the causes of faults and designate ways to eliminate them, and even more so in order to design and calculate these systems, you need to have appropriate training in the design and operation of the instrumentation devices. Hence the task of teaching the discipline is to train specialists for design, research and production activities in the field of creation, improvement and operation of instrumentation associated in one way or another with the movement and storage of oil and gas. As a result of studying the course "Instrumentation and Automation of Technological Machines", students should acquire knowledge to the extent that is sufficient to solve not only engineering problems, but also to read modern scientific and technical literature.
Having studied the discipline, the student must:
Know: the device and the principle of operation of instrumentation;
- methods and means of measurement; field of application of the relevant instrumentation.
To be able to: select the instrumentation depending on the tasks; free to use standards. Have an idea: about the basics of research, in the field of application of instrumentation; about evaluation methods conducting experiments with the use of instrumentation.

Technical diagnostics and maintenance of oil and gas machines and equipment
CODE – PED455
CREDIT - 6 (2/0/1/3)
BREAKFAST - GEN104, TEC104
The purpose of the study: is the formation of the future specialist knowledge on the design of diagnostic devices, their purpose and principles of operation, as well as the special training of engineering and technical personnel who have scientific and practical knowledge in the field of operation, because It solves actual engineering

and scientific problems in the field of quality, operational properties and rational use of these devices.

Summary: The discipline studies the methods and means used in diagnosing the technical condition of machines and equipment, including vibration diagnostics, leak detection, magnetic, eddy current, ultrasound; types of non-destructive testing. The use of instrumental methods and means of monitoring diagnostic parameters, embedded monitoring systems and diagnostics in diagnosing drilling equipment, vessels and apparatus for storing oil and oil products, installations for repairing wells and pumping equipment is considered. The foundations are laid for practical skills of structural analysis and selection of diagnostic informative signals, selection of technical means for their registration, and a diagnostic methodology.

Expected results:

Know: device and principle of operation of diagnostic devices; methods and means of measurement; field of application of the relevant diagnostic devices. To be able to: choose diagnostic devices, depending on the tasks; free to use standards. Have an idea: about the basics of research in the field of application of diagnostic devices; about methods for evaluating experiments using diagnostic devices.

Internship transport

CODE - TEC123

CREDIT - 6 (2/0/1/3)

TEC121 DECLINES

PURPOSE AND TASKS OF THE COURSE

The purpose of the discipline is to form the students the necessary knowledge on the design of units and mechanisms of underground transport vehicles used in the sectors of the national economy. At the modern scientific and technical level, the basics of selection, calculation and design of mechanisms, metal structures, separate special assemblies and parts of lifting machines are considered.

BRIEF DESCRIPTION OF THE COURSE

Classification of lifting and transport vehicles. Lifting machines. Appointments and types of lifting machines. General provisions for the calculation of lifting machines. Main settings. Lifting mechanisms and their elements. Polyspaste blocks, drums, stars. Load handling devices. Types of load gripping devices. Hooks. Special types of load gripping devices. Power and brake equipment. Drives. Electric drive Drum and band brakes. Movement mechanisms and their elements. Kinematic schemes. Determination of resistance to movement. The rotation mechanism. The mechanism for changing the boom and hook. Bridge type crane. Jib cranes. Self-propelled cranes. Transporting machines. General information about transporting cars. Screw

conveyors. Roller conveyors. Auxiliary devices transporting machines. Bunker Feeders. Unloading carts.
KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE
know: the main types of lifting transport vehicles; structural features of lifting and transporting machines; basic methods of designing and calculating lifting machines be able to: use the methods and means of composition in the design of machines: make design decisions that ensure the safety of the operation of machines.

Lubrication of metallurgical machines
CODE - PED151
CREDIT - 6 (2/0/1/3)
TEC112 DIALIZE
PURPOSE AND TASKS OF THE COURSE
The aim of the course is the training of a specialist for production, design and research activities in the field of development and improvement of lubrication systems and equipment, maintenance, modernization of the main and auxiliary equipment of technological production.
The objectives of the course mastering students the basics of designing lubrication systems for various purposes. At the first stage, practical exercises are aimed at consolidating lecture knowledge on the design stages, starting from the outline and ending with the working
BRIEF DESCRIPTION OF THE COURSE
Operational properties of technological machines. Operational properties of elements of technological machines, subject to temperature, corrosive effects. Lubrication technology equipment. Lubricating oil. Additives to lubricating oils. Grease lubricants. Selection, supply and methods of calculating the consumption of lubricant. Lubrication of machine support units. Centralized lubrication systems. Pipelines and fittings for lubrication systems. Regeneration of waste oils. Lubrication of the blast furnace top mechanism. Lubrication of fluid friction bearings. Manual DSPs. Automatic DSPS. Pipelines and fittings for lubrication systems. Safety and relief valves. Regeneration of waste oils. Physical methods: sedimentation, filtration, centrifugal cleaning. Physico-chemical methods
KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE
calculation of performance indicators of equipment operation; choose lubricants for typical friction units; fundamentals of designing lubrication systems for various purposes

Energy-saving equipment and technologies in the oil and gas industry
CODE – PED456
CREDIT - 6 (2/0/1/3)
PEREQUISIT - PED192, TEC191
PURPOSE AND TASKS OF THE COURSE
The purpose of the study: the purpose of teaching the discipline is to familiarize future specialists with the ways to solve energy-saving technologies and other relevant issues.
Summary: in this discipline the basics of energy technology and secondary energy resources (VER) are studied. Basic terms and definitions of energy saving. Energy saving in the oil and gas industry. The main directions of the use of VER. Sources VER. Prospects for the development of unconventional energy sources. Energysaving measures in the technology of the oil and gas industry. The use of heat pump installations in the gas and oil industry. Utilization and use of VER gas turbine installations at compressor stations of main gas pipelines.
Expected results:
know:
- basics of energy technology;
- main terms and definitions of energy saving;
- secondary energy resources;
-VER directions;
energy-saving measures in the technology of the oil and gas industry;
- utilization and use of VER gas mains

Industrial safety in the oil and gas industry
CODE – PED457
CREDIT - 6 (2/0/1/3)
PEREAT - PHY112
The purpose of studying the discipline "Industrial safety in the oil and gas industry" is to form students' ideas about the complex of scientifically grounded constructive, technological, and organizational measures aimed at minimizing the anthropogenic impact of oil and gas facilities on environmental components.
As a result of studying the discipline "Industrial safety in the oil and gas industry," students should master the skills of forecasting and assessing the effects of anthropogenic impact on environmental components in the construction and operation of oil and gas facilities.

The general task of studying the discipline is to train specialists who are able to apply acquired knowledge and skills in their professional activities at the facilities of the oil and gas sector.

As a result of studying the course of the discipline "Industrial safety in the oil and gas industry," students must:

know - the classification, composition, sources of technological impact of objects of the oil and gas industry; criteria for the selection of design solutions to minimize or prevent the anthropogenic impact of oil and gas facilities on environmental components; the basics of modern technologies and technical means to ensure the reliability of oil and gas facilities from the standpoint of environmental requirements; technologies for restoring and optimizing the state of environmental components disrupted during the operation of oil and gas facilities; The main provisions of the environmental regulatory framework.

be able to - predict the consequences of the anthropogenic impact of objects of the oil and gas industry on environmental components; to develop measures aimed at improving the environmental reliability of oil and gas facilities; perform calculations on the pollution of the components of the natural environment during the extraction, transportation and storage of hydrocarbons and products; to make an ecological and economic assessment of the effectiveness of the chosen ways to minimize the anthropogenic impact of oil and gas facilities, analyze modern technological solutions to improve the environmental safety of facilities.

12 PROTECTION OF THE THESIS / DIPLOMA PROJECT

The purpose of the thesis (project) is:

1) systematization, consolidation and expansion of theoretical knowledge and practical skills in the specialty and their application in solving specific scientific, technical, economic and production tasks, as well as tasks for cultural purposes;

2) the development of skills for conducting independent work and mastering the methodology of scientific research and experimentation in solving problems and issues under development;

3) clarification of the student's readiness for independent work in the conditions of modern production, science, technology, culture, as well as the level of his professional competence.

SHORT DESCRIPTION

The order of protection of the thesis (project) is determined by the Rules for the ongoing monitoring of progress, intermediate and final state certification of students in educational institutions, approved by orders of the MES RK. The thesis (project) is defended at an open meeting of the state attestation commission with the participation of at least half of its members. The defense of the thesis (project) is organized in a public form, with the presence of students, teachers of the graduating department. The scientific adviser, representatives of the organization, on the basis of which the diploma research and other interested persons were also invited, could be invited to the defense. The duration of the defense of one thesis, as a rule, should not exceed 30 minutes per student. To protect the thesis, the student makes a report to the state attestation commission and those present for no more than 15 minutes. All those present in the form of questions or speeches can take part in the discussion of the thesis (project). After discussion, the secretary of the commission reads the recall (in the case of

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