Satbayev University
Institute of Industrial Automation and Digitalization
Department of Power Engineering

CURRICULUM PROGRAM

«POWER ENGINEERING»
Bachelor of Technology and Technology
Electrical engineering and power engineering

on the basis of the following specialties of the expired Classifier of specialties: 5B071700 - Heat power engineering and 5B071800 – Electrical power engineering

1st edition
in accordance with the GOSO Higher Education 2018

Almaty 2020

The program was drawn up and signed by the parties:

From KazNRTU named after K.I.Satpayev:

1 Head of the Department of Power Engineering, PhD, associate professor — Ye. Sarsenbayev

2 Director of the Institute of Industrial Automation and Digitalization, PhD — B.Omarbekov

3 Chairman of the educational and methodological group of the Department of Power Engineering, Candidate of Technical Sciences, Associate Professor — Ye. Khidolda

From employers - Director LLP "Lighting Technologies Kazakhstan" — G.E. Abdykalykov

Approved at a meeting of the Educational and Methodological Council of the Kazakh National Research Technical University named after K.I. Satbayev. Minutes No. 4 dated 14.01.2020

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

Professional competencies: Power Engineering, heat and power engineering, electric power engineering, thermal installations, electric power systems and networks, power supply, renewable energy

1 Summary of the program

The professional activities of the program's graduates are directed to the field of Electric Power Engineering, heat and electricalengineering.

The direction of the specialty and specialization program covers engineering andengineering.

The aim of the educational program is to teach students general education, basic and specialized disciplines with the achievement of appropriate competencies.

The objectives and content of the educational program can be found in Section 9 of the "Description of Disciplines."

If the full course of the bachelor's degree is successfully completed, the graduate is awarded an academic degree in engineering and technology in electrical and Power Engineering.

The bachelor's education program "Power Engineering" differs from the existing educational programs in the specialties 5B071700 - "Heat Power Engineering" and 5B071800 - "Electric Power Engineering" by updating the internal content of disciplines related to the production, transmission and consumption of thermal and electrical Power Engineering and the addition of disciplines on renewable Power Engineering. A number of disciplines have proposed new content, including approaches based on Power Engineering conservation and Power Engineering efficiency in Power Engineering plants, and includes several courses on modern industrial technologies in the Electric Power Engineering industry.

The educational program has increased the volume of mathematical, natural science, basic and language disciplines. Specialized disciplines have been added, which can be divided into four groups: disciplines in thermal Power Engineering, disciplines in Electric Power Engineering, disciplines on alternative Power Engineering and laboratory workshops on the use of modern technology. As a result, we have an educational program that has innovative and practical content and is aimed at implementing the Digital Kazakhstan program.

The educational program includes the following innovative disciplines:

- laboratory workshop on modern industrial technologies in the electric power industry (1, 2, 3);
- Power Engineering audit and Power Engineering saving in enterprises;
- renewable Power Engineering;
- modelling in Power Engineering systems
- calculating and designing Electric Power Engineering systems;
- calculating and designing power grids and systems;
- calculating and designing thermal exchange equipment;
- calculating and designing an automated electric drive.

In the process of mastering the educational program, bachelor of engineering and. technology in electrical engineering and Power Engineering should have the following key competencies.

The Bachelor should:

have an idea:

- about modern thermal and Electric Power Engineering facilities, autonomous power sources and renewable Power Engineering facilities, promising directions for Power Engineering development;
- modern approaches to calculating and designing Power Engineering systems, as well as the use of software tools for the management and evaluation of Power Engineering systems;
- about modern elements and installations of Power Engineering systems (devices, devices, conductors, equipment, executive mechanisms, microprocessors, etc.).

to know:

- theoretical and experimental research methods to create promising new directions in the field of electrical engineering and Power Engineering;
- principles of work, specifications and design features of Power Engineering products developed and used;
- standards, methodical and regulatory materials, design, installation and operation of electrical and thermal installations of the Power Engineering industry;

be able to:

- develop the principles of the organization and design of Power Engineering companies;
- use application packages to calculate, model and automate Power Engineering systems design;

to have skills:

- to formulate the basic feasibility and economic requirements for the Power Engineering systems being projected;
- the organization of work on the operation, installation and installation of electrical and thermal facilities;
- development and design on a modern elemental and technical basis of Power Engineering systems and individual devices.

The training includes production practices at such companies as: NK KEGOC, AIK, ALES, Almaty Thermal Networks LLP, VKREK, TATAK, Ontustik Heat Transit, Kazatomprom, Kazzink LLP, Karachaganak Petrolium Operiting and others.

2 Requirements for incoming

Admission to the university is carried out on the applications of the applicant, who completed in full secondary, secondary-special education on a competitive basis in accordance with the points of the certificate issued on the results of a single national test with a minimum score - at least 65 points.

Special requirements for admission to the program apply to graduates of 12 summer schools, colleges, applied baccalaureate programs, NIS, etc. Such applicants must pass diagnostic testing in English, mathematics, physics and special subjects.

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

Code	Competence type	Description	Competence result	Responsible
Shared (Includes full training with possible additional, depending on the level of knowledge)				
G1	Communication	- Fugitive monolingual oral, written and communication skills - The ability not to communicate fluently with a second language - The ability to use communicative communication in different situations - There are basics to academic writing in their native language - Diagnostic language test	Full 4-year study with a minimum of 240 academic loans (of which 120 contact classroom academic credits) with a possible re-recording of loans in the second language where students have an advanced level. The level of language is determined by passing the diagnostic test	Department of Kazakh and Russian, Department of English
G2	Mathematical Literacy	- Basic 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 study with a minimum of 240 academic loans (of which 120 are contact auditary academic loans). With a positive test of diagnostic test, the level of mathematics 1, the negative - the level of algebra and the beginning of the analysis	Mathematics Department
G3	Basic literacy in science disciplines	- A basic understanding of the scientific picture of the world with an understanding of the basic laws of science - Understanding basic hypotheses, laws, methods, drawing conclusions and assessing errors	Full 4-year study with a minimum of 240 academic loans (of which 120 are contact auditary academic loans). With a positive test of diagnostic test level Physics 1, General Chemistry, at negative - the level of the Beginning of	Departments in the fields of natural sciences

			Physics and basic basics of chemistry	
Specific (includes reduced tuition by re-counting credits depending on the level of competence knowledge for graduates of 12-year schools, colleges, universities, including humanitarian and economic areas)				
S1	Communication	- Fugitive bilingual oral, written and communication skills - The ability not to communicate fluently with a third language - writing skills of different styles and genres - skills of deep understanding and interpretation of one's own work of a certain level of complexity (essay) - basic aesthetic and theoretical literacy as a condition of full perception, interpretation of the original text	Full re-repayment of credits by language (Kazakh and Russian)	Department of Kazakh and Russian
S2	Mathematical Literacy	- Special mathematical thinking using induction and deduction, generalization and specification, analysis and synthesis, classification and systematization, abstraction and analogy - The ability to formulate, substantiate and prove positions - Application of common mathematical concepts, formulas and extended spatial perception for mathematical tasks - Full understanding of the basics of mathematical analysis	Re-credit for The Discipline of Mathematics (Calculus) I	Mathematics Department
S3	Special literacy in science disciplines (Physics, Chemistry, Biology and Geography)	- A broad scientific perception of the world that suggests an understanding of natural phenomena - Critical perception to understand the phenomena of the world around - cognitive ability to formulate a scientific understanding of the forms of existence of matter, its interaction in	Re-credits for Physics I, General Chemistry, General Biology, Introduction to Geology, Introduction to Geodesy; Training practice, etc.	Departments in the fields of natural sciences

		nature		
S4	English language	- Readiness for further self-learning in English in various fields - Ready to gain experience in design and research using English	Refilort English credits above academic to professional level (up to 15 credits)	Department of English
S5	Computer skills	- Basic programming skills in one modern language - Use software and applications to teach different disciplines	Reset Credits on Discipline Introduction to Information an Communication Technologies, Information and Communication Technologies	Department of Software Engineering
S6	Social and humanitarian competencies and behaviour	- Understanding and understanding the responsibility of every citizen for the development of the country and the world - The ability to discuss ethical and moral aspects in society, culture and science	Re-credit for Kazakhstan's Modern History (excluding state exam)	Department of Public Discipline
		- Critical understanding and the ability to debate on modern scientific hypotheses and theories	Re-credit credits for philosophy and other humanities	
PROFESSIONAL (includes reduced education by re-counting credits depending on the level of knowledge on competences for college graduates, AV schools, universities)				
P1	Professional competencies	- Critical perception and a deep understanding of professional competencies at level 5 or 6 - The ability to discuss and debate professional issues within the framework of the mastered program	Re-credits for basic professional disciplines, including introduction to specialty, engineering ethics, robotic technology, automation technology, theoretical basics of electrical engineering, technological measurements and instruments, mathematical basics of control theory, electronic automation devices.	Releasing chair
P2	General Engineering Competencies	- Basic general engineering skills and knowledge, the ability to solve general engineering problems and problems - be able to use application packages to process experimental data, solve algebraic and differential equation systems	Re-credit for general engineering disciplines (engineering graphics, outline geometry, electrical engineering basics, microelectronics basics.)	Releasing chair
P3	Engineering and computer competencies	- Basic skills in using computer programs and software systems to solve	Re-credit for computer graphics discipline, computer modeling and programming in	Releasing chair

		general engineering problems	the MatLab environment.	
P4	Socio-economic competences	- Critical understanding and cognitive ability to reason on contemporary social and economic issues - A basic understanding of the economic assessment of research sites and the profitability of projects.	Re-transfer credits for socio-humanitarian and technical and economic disciplines in the set-off of the electorate cycle	Releasing chair

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

3 Requirements for completing your studies and getting a diploma

General standard requirements for graduation and awarding a bachelor's degree: mastering at least 240 academic credits of theoretical training and final diploma work or state exam in specialty.

Special requirements for graduating from university under this program

graduate should know:

- theoretical and experimental research methods to create promising new directions in the field of electrical engineering and Power Engineering;
- principles of work, specifications and design features of Power Engineering products developed and used;
- standards, methodical and regulatory materials, design, installation and operation of electrical and thermal installations of the Power Engineering industry;

graduate should be able to:

- develop the principles of the organization and design of Power Engineering companies;
- use application packages to calculate, model and automate Power Engineering systems design;
- to formulate the basic feasibility and economic requirements for the Power Engineering systems being projected;
- to organize the operation, installation and installation of electrical and thermal facilities.

Training in this OP is completed by passing the state exam in the following disciplines or protection before the GAC diploma project (work).

4 Working curriculum of the educational program

CURRICULUM OF EDUCATIONAL PROGRAM for 2020-2021 academic year admission

Educational program 6B07101 - "Power Engineering"

Group of educational programs - B62 Electrical and Power Engineering

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

Year of study	Code	Name of discipline	Cycle	Credits	lec/lab/pr/ISW	Code	pre-requisites	Code	Name of discipline	Cycle	Credits	lec/lab/pr/ISW	Code	pre-requisites
		1 semester (fall 2020)							**2 semester (spring 2021)**					
	LNG 1051	Beginner (A1)						LNG 1052	Elementary English (A1)					LNG 1051
	LNG 1052	Elementary English (A1)						LNG 1053	General English 1 (A2)					LNG 1052
	LNG 1053	General English 1 (A2)	G	6	0/0/3/3	S4	Diagnostic testing	LNG 1054	General English 2 (A2)	G	6	0/0/3/3	S4	LNG 1053
	LNG 1054	General English 2 (A2)						LNG 1055	Academic English (B1)					LNG 1054
	LNG 1055	Academic English (B1)						LNG1056	Business English (B2)					LNG 1055
	LNG1056	Business English (B2)						LNG 1057	Professional English (B2+)					LNG1056
	LNG1012	Basic Kazakh (Russian) language (A2)						LNG107	Kazakh/Russian language. Academic level (B1)					LNG10121
1	LNG1012.1	Academic Kazakh (Russian) language (B1)	G	4	0/0/2/2	S1	Diagnostic testing	LNG107	Business Kazakh (B2)/Russian. Advanced level (B2)	G	6	0/0/3/3	S1	LNG1012.1
	LNG1012.2	Business Kazakh (Russian) language (B2)						1105	Elective					
	MAT00110	Algebra and Introduction to Calculus	B	6	0/0/3/3	S2	Diagnostic testing	MAT101	Calculus I	B	6	1/0/2/3	No	MAT10010
	MAT101	Calculus I						MAT102	Calculus II					MAT101
	PHY110	Physics Begin	B	6	1/1/1/3	S3	Diagnostic testing	PHY111	Physics I	B	6	1/1/1/3	No	PHY110
	PHY111	Physics I						PHY112	Physics II					PHY111
	HUM113	The modern history of Kazakhstan	G	6	1/0/2/3	S6	No	ERG158	Reading electrical circuits	B	6	1/0/2/3	P1-3	ERG122
	ERG104	Introduction to the specialty	B	6	2/0/1/3	S3	No	ERG176	Electrical materials science	B	6	2/0/1/3	No	No
	KFK101	Physical education I	G	4	0/0/2/2	No	No	KFK102	Physical education II	G	4	0/0/2/2	No	No
		Total:		**38**	19				**Total:**		**40**	20		
		3 semester (fall 2021)							**4 semester (spring 2022)**					
	LNG 1053	General English 1 (A2)					LNG 1052	LNG 1054	General English 2 (A2)					LNG 1053
	LNG 1054	General English 2 (A2)					LNG 1053	LNG 1055	Academic English (B1)					LNG 1054
	LNG 1055	Academic English (B1)	G	6	0/0/3/3	No	LNG 1054	LNG1056	Business English (B2)	G	6	0/0/3/3	No	LNG 1055
	LNG1056	Business English (B2)					LNG 1055	LNG 1057	Professional English (B2+)					LNG1056
	LNG 1057	Professional English (B2+)					LNG1056	2108	ELECTIVE					
	CSE174	Information and Communications Technology	G	6	2/0/1/3	S5	No	HUM124	Philosophy	G	6	1/0/2/3	S6	No
2	MAT102	Calculus II	B	6	4/0/0/4	No	MAT101	MAT103	Calculus III	B	6	1/0/2/3	No	MAT102
	MAT103	Calculus III			1/0/2/3		MAT102	MAT126	Ordinary Differentiation Equations MatLab					MAT103
	PHY112	Physics I	B	6		No	PHYS111	ERG175	Electrical and thermotechnical measurements	B	6	2/1/0/3	P1-3	No
	PHY415	Physics II			1/1/1/3		PHYS112	2214	ELECTIVE	B	6		P1-3	PHY112
	ELC165	Theoretical Foundations of Electrical Engineering I	B	6		P1-3	PHY111	ERG131	Industrial electronics	S	6	2/1/0/3	P1-3	ELC163
	ERG147	Theoretical foundations of heat engineering	B	6	2/0/1/3	P1-3	PHY111							
	HUM126	Social & Political Knowledge	O	8	2/1/0/3	S6								
		Total:		**44**	22				**Total:**		**36**	18		
		5 semester (fall 2022)							**6 semester (spring 2023)**					
	MAT126	Ordinary Differentiation Equations MatLab	B	6	1/0/2/3	No	MAT103	ERG448	Power supply enterprises	B	6	1/1/1/3	No	ERG179
	MAT127	Partial Differentiation Equations MatLab					MAT105	3219	ELECTIVE	B	6			
	ERG153	Technical Thermodynamics	B	6	2/0/1/3	P1-3	PHY112	3220	ELECTIVE	B	6			
3	AUT146	Basics of Automation	B	6	2/1/0/3	P1-3	PHYS111	ERG423	Laboratory workshop on modern industrial technologies in the electric power industry II	S	6	0/3/0/3	No	ERG422
	ERG168	Electrical machines	S	6	2/1/0/3	P1-3	ELC163	3307	ELECTIVE	S	6			
	ERG422	Laboratory workshop on modern industrial technologies in the electric power industry I	S	6	0/3/0/3	P1-3	No	ERG107	ELECTIVE	S	6			
	ERG166	Electrical apparatus	S	6	2/1/0/3	P1-3	ERG176							
		Total:		**36**	18				**Total:**		**36**	18		
		7 trimester (fall 2023)							**8 trimester (spring 2024)**					
	ERG107	Renewable energy	S	6	1/1/1/3	No	ERG104	ERG124	Electrical Safety Basics	S	6	1/1/1/3	No	ERG448
	4310	ELECTIVE	S	6		No		ERG180	Energy audit and energy saving in enterprises	S	6	2/0/1/3	No	No
	4311	ELECTIVE	S	6		No		4315	ELECTIVE	S	6		No	
4	4312	ELECTIVE	S	6		No		ECA001	Preparation and writing of the thesis (project)	FA	4			
	ECA001	Preparation and writing of the thesis (project)	FA	4				ECA103	Defense of thesis (project)	FA	6			
		Total:		**28**	12				**Total:**		**28**	8		

Additional academic programes (AAP)

Year of study	Code	Name of discipline	Credits	Semester
2	AAP122, 132	Physical education III, IV (optional)	0	3-4
1	AAP101	Educational practice	2	2
1	AAP109	Manufacturing Practice I	2	4
2	AAP103	Manufacturing Practice II	4	6
3	AAP500	Military training	0	3-6

Total number of credits

Cycle of disciplines	Credits: compul.	elect ive	total
Cycle of general disciplines (G)	68	0	68
Cycle of basic disciplines (B)	102	18	120
Cycle of special disciplines (S)	48	36	84
Total of theoretical study :	**218**	**54**	**272**
Final attestation (FA)	14	0	14
Total:	**232**	**54**	**286**
Extra education	8	0	**8**
OVERALL:	**240**	**54**	**294**

ELECTIVE DISCIPLINES OF THE EDUCATIONAL PROGRAM for recruitment for the 2019-2020 academic year

Educational program 6B07101 - "Power Engineering"

Group of educational programs - B62 Electrical and Power 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 /ISW	Prerequisites
1	**2 semester (spring 2021)**						
	1106	LNG10761	Kazakh language. Culture of business communication (C1)	G	6	0/0/3/3	LNG1012.2
		LNG10752	Russian language. Rhetoric (C1)				
		LNG10741	Professional Kazakh				
		LNG10742	Professional Russian				
	Total:				**6**		
2	**4 semester (spring 2022)**						
	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				
	2214	ERG122	Heat and mass transfer equipment of enterprises	B	6	2/0/1/3	PHY112
		ELC166	Theoretical Foundations of Electrical Engineering II			2/1/0/3	ELC165
	Total:				**12**		
3	**6 semester (spring 2023)**						
	3217	ERG433	Transition processes in energy systems	B	6	2/0/1/3	ELC163
		ERG123	Theoretical Foundations of Fuel Combustion and Furnace Plants				ERG122
	3220	ERG435	Electricity networks and systems	B	6	1/1/1/3	ERG166
		ERG436	Electrical part of power plants and substations				ERG166
		ERG425	Hydrogasodynamics of media in heat power plants				ERG123
	3307	ERG179	Power and electrical equipment	S	6	2/0/1/3	ELC163
		ERG112	Boiler plants and paragenerators				ERG147
	3308	ERG447	Automated electric drive	S	6	1/1/1/3	ERG168
		ERG194	Superchargers and heat engines			2/0/1/3	ERG147
	Total:				**24**		
4	**7 trimester (fall 2023)**						
	4310	ERG163	Operation of TPP equipment	S	6	2/0/1/3	ERG194
		ERG431	Modeling in energy systems			2/1/0/3	MAT126
	4311	ERG197	Lighting technology and lighting	S	6	2/0/1/3	ERG448
		ERG409	Heat engines and gas turbines				ERG194
	4312	ERG142	Relay protection of power systems	S	6	1/1/1/3	ERG166
		ERG126	Steam-Gas and Gas-Turbine Facilities for Heat and Nuclear Power Plants			2/0/1/3	ERG194
	Total:				**18**		
	8 trimester (springl 2024)						
	4315	ERG139	Calculation and design of power supply systems	S	6	2/0/1/3	ERG448
		ERG136	Calculation and design of electric power networks and systems				ERG178
		ERG137	Calculation and design of heat and mass transfer equipment				ERG123
		ERG135	Calculation and design of an automated electric drive				ERG447
	Total:				**6**		

The number of credits in elective disciplines for the entire period of study	
Disciplines	**Loans**
The cycle of general education (G)	12
The cycle of basic disciplines (B)	18
The cycle of special disciplines (S)	36
Total:	66

5 Levels and volumes of knowledge, skills, skills and competencies

A - knowledge and understanding:
A1 - methods of building electrical, technological and functional schemes for the design of Power Engineering systems;
A2 - current trends in the development of technical and technological systems of Power Engineering facilities;
A3 - standards, methodical and regulatory materials accompanying the operation, installation and installation of thermal power and Electric Power Engineering facilities.

B - applying knowledge and understanding:
B1 - independent work and offer various options for solving professional problems using theoretical and practical knowledge;
B2 - to organize installation, installation and operation of Electric Power Engineering and thermal systems;
B3 - to organize the collection, storage and processing of information used in the field of professional activity.

C - the formation of judgments:
C1 - about modern Power Engineering industry facilities and process management systems;
C2 - on the application of modern autonomous Power Engineering systems of different categories of consumer approaches;
C3 - about modern technical devices and technological equipment of Power Engineering facilities (devices, devices, conductors, equipment, executive mechanisms, microprocessors, etc.).

D - personal abilities:
D1 - to be an Power Engineering engineer, electrical engineer of the production division of the operation of Power Engineering systems;
D2 - to be a specialist in the maintenance of electrical and thermal networks, and systems;
D3 - to be an engineer of the production unit for the repair of thermal and electrical installations;
D4 - to be able to organize work on setting up Power Engineering and electromechanical plants of industrial enterprises.

6 Competences at the end of training

B - Basic knowledge, skills andskills:
B1 is capable of philosophical analysis of social phenomena, personality behavior and other phenomena. I am ready to conduct a philosophical assessment of social phenomena;
B2 - to know and apply in practice the basics of engineering professional ethics;
B3 - to be able to analyze the current problems of the modern history of Kazakhstan.

P - Professional competencies, including in accordance with the requirements of industry professionalstandards:
P1 is a wide range of theoretical and practical knowledge in the professional field;
P2 - is able to analyze and solve problems on the theory of electrical circuits and heat technology;
P3 - is able to analyze thermal, electrical and installation schemes of technological production. I am ready to install, set up and operate thermal and electrical installations, and systems.

O - Human, social and ethicalcompetences:
O1 - is able to freely use english as a means of business communication, a source of new knowledge in the field of electrical engineering and Power Engineering. I am ready to use the English language in the professional activities in the field of Electric Power Engineering and heat Power Engineering;
O2 - is able to freely master the Kazakh (Russian) language as a means of business communication, a source of new knowledge in the field of electrical engineering and Power Engineering. I am ready to use the Kazakh (Russian) language in professional activities in the field of Electric Power Engineering and heat Power Engineering;
O3 - to know and apply in work and life the basics of applied ethics and ethics of business communication;
O4 - to know and apply the basic concepts of professional ethics;
O5 - to know and apply in practice the "code of conduct of engineer";
O6 - to know and solve the problems of human influence on the environment.

C - Special and Management Competencies:
C1 - self-management and control of work and training processes within the framework of the organization's strategy, policies and objectives, discussion of the problem, reasoning of conclusions and competent operation of information;
C2 - *in the field of organizational and management activities:* to be the head of the group of the division for the operation, installation and repair of power plants in various industries;

C3 - *in the field of experimental research:* to be a specialist in experimental research of thermal and electric power facilities;
C4 - *in the field of research:* to be an engineer of a scientific laboratory for the research and development of modern Power Engineering installations and systems in various industries;
C4 - in the field*ofdesign:*to be an engineer in the development and design of electric power plants, and systems in various industries.

7 Minor Supplemental Education Policy

When mastering at least 12 credits in the disciplines of the program, including mandatory disciplines:
M1 - English;
M2 - Modern History ofKazakhstan;
M3 - Physics 1 and2;
M4 - Mathematics 1,2,3;
M5 - The Theoretical Basics of Electrical Engineering;
M6 - The Theoretical Basics of Heat Engineering;
M7 - Electric cars.
the graduate is assigned an additional Minor specialty with the issuance of an annex to the diploma of the established sample.

8 ECTS diploma application

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.

9 Description of disciplines

Introduction to the specialty

CODE - ERG104
CREDIT - 3 (2/0/1)
PREREQUISITE - no

THE PURPOSE AND TASK OF THE COURSE

Students gain the knowledge, skills and skills necessary to successfully master general technical and special disciplines, as well as in subsequent production or management activities.

SUMMARY OF THE COURSE

Power Engineering resources and their use. Renewable and non-renewable Power Engineering sources. The main provisions of technical thermodynamics. The basics of the theory of heat exchange. Convective and radiant heat exchange. Modern ways of generating electric Power Engineering. Cycles of thermal, electrical, hydroelectric and nuclear power plants. Ways to convert different types of Power Engineering into electrical Power Engineering. Unconventional ways of generating Power Engineering. The concept of an electrical system. Power management. The impact of technology and Power Engineering on the biosphere.

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

Students will know:

- should understand the concept of providing Electric Power Engineering consumers, understand the structure of the Electric Power Engineering industry, the relationship between its various links, have an idea of the latest advances in digital protection technology and automation of elements of the power system, operational information complexes (OIC) integrated substation management systems, get an idea of the composition of Electric Power Engineering consumers in various industries.

Students will be able to:

- The ability to develop consumer Electric Power Engineering systems
- satisfying reliable and safe operation that delivers quality voltage at electrical Power Engineering receivers.

Electrical and thermal measurements

CODE - ERG 1752
CREDIT - 3 (2/1/0)
PREREQUISITE - no

THE PURPOSE AND TASK OF THE COURSE

Teaching the course "Electrical and Thermal Dimensions" aims to give students the basics of knowledge and skills necessary to solve the production and scientific tasks associated with the choice of methods and means of measurement, with the measurement of different physical values, with the assessment of the accuracy of measurement results.

SUMMARY OF THE COURSE

The "Electrical and Thermal Dimension" discipline is a profiling subject where students receive basic knowledge of theory, device, as well as their graphic designation according to state standards and a single system of design documents (ESCD). They also gain knowledge about metrology, measurement classification and their errors, methods of measuring various electrical and thermal values.

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

Students will know:

As a result of studying the discipline, students should:

- know the basic concepts of action, properties, characteristics of common means of measuring different physical values;
- know the basic methods of measuring different physical values;
- to be able to choose methods and means of measurement;
- be able to take measurements and assess the accuracy of measurements;
- be able to check the means of measurement.

Algebra and the beginning of mathematical analysis

CODE - MAT00120
CREDIT - 3 (1/0/2)
PREREQUISITE - diagnostic test

COURSE GOALS AND OBJECTIVES

The aim of the course is to introduce students to the basic ideas and concepts of algebra and mathematical analysis by informing the basic knowledge needed to study the course "Mathematics 1".

The objectives of the course are to develop skills to study mathematical disciplines and effectively use mathematical methods to solve research and practical problems in the professional field.

SUMMARY OF THE COURSE

In the course "Algebra and introduction to analysis"are given the basic concepts of algebra, mathematical analysis, differential and integral calculus.

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

Student should know:

- basic concepts of algebra;
- basic concepts of mathematical analysis;
- basic elementary functions;

must be able to:

- to find solutions to equations and inequalities, systems of equations and inequalities;
- transform algebraic and trigonometry expressions;
- to solve text problems;
- find a derivative of elementary functions;
- explore functions using a derivative.
- find an uncertain integral from elementary functions;
- to find a certain integral;
- to find the area of the curved trapeze.

Mathematics I

CODE - MAT00121
CREDIT - 3 (1/0/2)
PREREQUISITE - Elementary Mathematics - school course/diagnostictest

COURSE GOALS AND OBJECTIVES

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

Course objective:

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

SUMMARY OF THE COURSE

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

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

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

Mathematics II

CODE - MAT00122
CREDIT - 3 (1/0/2)
PREREQUISITE - Mathematics 1

COURSE GOALS AND OBJECTIVES

The purpose of teaching the course "Mathematics II" is to form bachelor's ideas about modern mathematics as a whole as a logically coherent system of theoretical knowledge.

The goal of the course is to instill students with solid skills in solving mathematical problems and bring the solution to a practically acceptable result. Develop primary skills in mathematical research of applied issues and the ability to independently understand the mathematical apparatus contained in the literature related to the student's specialty.

SUMMARY OF THE COURSE

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

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

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

Mathematics III

CODE - MAT00123
CREDIT - 3 (1/0/2)
PREREQUISITE - Mathematics I, Mathematics II

COURSE GOALS AND OBJECTIVES

The purpose of teaching the course "Mathematics III" is to develop basic knowledge and skills with a high degree of understanding in the course sections that help to analyze and solve theoretical and practical problems.
Course objective: instilling students with the ability to independently study educational literature, conduct theoretical-probabilistic and statistical analysis of applied problems; developing logical thinking and improving the General level of mathematical culture.

SUMMARY OF THE COURSE

The course "Mathematics III" includes sections: series theory, elements of probability theory and mathematical statistics and is a logical continuation of the discipline "Mathematics II".

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE
Student should know:

- the theory of numerical series;
- the theory of functional series;
- fourier's rows;
- elements of probability theory and mathematical statistics;

must be able to:

- solving problems on all sections of the series theory;
- to find the probability of events;
- find numerical characteristics of random values.
- use statistical methods to process experimental data;

Physics I, II

CODE – PHYS111-112
CREDIT - 6 (2/2/2)
PREREQUISITE-diagnostic test /PHYS110-111

COURSE GOALS AND OBJECTIVES

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

SUMMARY OF THE COURSE

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

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

- skills 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 the system of professional activity.

Ordinary differential equation. MatLab

CODE - MAT105
CREDIT - 3 (2/0/1)
PREREQUISITES -Mathematics I-III

COURSE GOALS AND OBJECTIVES

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

The course aims to teach students to recognize the types and forms of integrable equations and systems, integrate them, and apply differential equations to mathematical solutions of applied problems.

SUMMARY OF THE COURSE

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

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

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

Modern history of Kazakhstan

CODE - HUM113
CREDIT - 3 (1/0/2)
PREREQUISITES - no

COURSE GOALS AND OBJECTIVES

The aim of the course is to familiarize engineering students with the basic theoretical and practical achievements of Soviet historical science on the history of modern Kazakhstan, comprehensive and systematic study of the main stages of formation and development of Kazakhstan 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, socio-economic, and 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, belonging to their people and Fatherland;

SUMMARY 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. Modern history of Kazakhstan studies the national liberation movement of the Kazakh intelligentsia at the beginning of the XX century, the period of creation of the Kazakh ASSR, as well as the process of formation of a multinational society.

KNOWLEDGE, SKILLS AT THE END OF THE 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 the Kazakh state;
- ability to analyze complex historical events and predict their further development;
- ability to work with all types of historical sources;
- ability to write essays and scientific articles on the history of the Fatherland;
- ability to use historical concepts;
- ability to conduct a discussion;
- skills of independent analysis of historical facts, events and phenomena;
- public speaking skills.

Kazakh/Russian

CODE - LNG1012
CREDIT - 2 (0/0/2)
PREREQUISITES - diagnostic test

COURSE GOALS AND OBJECTIVES

- teach students to listen to statements on well-known topics related to home, school, and leisure time;
- understand texts on personal and professional topics that contain the most frequent words and expressions;
- be able to conduct a conversation on everyday topics; describe your experiences; Express your opinion; retell and evaluate the content of the book you read, the movie you saw;
- be able to create simple texts on well-known topics, including those related to professional activities.

SUMMARY OF THE COURSE

The language material of the course is selected in such a way that the student, learning the lexical and grammatical minimum, has the opportunity to get acquainted with typical communicative situations and find himself in such situations, be able to correctly assess them and choose the appropriate model (strategy) of speech behavior. The main focus of training is transferred from the process of knowledge transfer to learning how to use the language being studied for various types of speech activities, such as reading (provided that the reading is understood), listening (provided that the same condition) and producing texts of a certain complexity with a certain degree of grammatical and lexical correctness.

The material for classes is selected so that students, while studying the Kazakh/Russian language, acquire skills of reading, writing and understanding of spoken speech on the basis of simultaneous development of the basics of grammar (phonetics, morphology and syntax) and word usage in the course of constant repeated repetition with a gradual complication of tasks.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

A student who actively organizes work in the classroom and conscientiously completes homework by the end of the first semester acquires skills that correspond to the pan-European level A2 (Threshold according to the ALTE classification), that is, they are on the threshold of independent language proficiency.

English

CODE - LNG1051-1057
CREDIT - 3 (0/0/3)
PREREQUISITES - diagnostic test/LNG1051-1056

LNG1051
COURSE GOALS AND OBJECTIVES
The "Beginner English" discipline is designed primarily for learning from scratch. This course is also suitable for those who have only general elementary knowledge of the language. After passing this level, the student will be able to confidently communicate on the basic topics in English, learn the basics of grammar and lay a certain foundation that will improve their skills in the next stage of learning English.
Постреквизиты курса: Elementary English.

LNG1052
COURSE GOALS AND OBJECTIVES
"Elementary English" discipline is the foundation of english language learning, which aims to develop students' basic skills (reading and listening) and productive skills (writing and speech), analysis of basic knowledge, use and memorization of the main grammar rules and mastering the features of pronunciation and elementary vocabulary, as well as encouraging self-learning and critical thinking.
Course pre-editing: Beginner.
Course post-quest: General 1.

LNG1053
COURSE GOALS AND OBJECTIVES
The aim of the GeneralEnglish1 course is to provide students with the opportunity to gain sufficient knowledge to become more free in everyday social and academic settings. Students are working to improve pronunciation, vocabulary and grammar. At this level, the main task will be to consolidate the skills gained earlier, learn to compose and properly apply complex syntax designs in the English language, as well as achieve a really good pronunciation.
Пререквизиты курса: Elementary English.
Course post-quest: General 2.

LNG1054
COURSE GOALS AND OBJECTIVES

The General English 2 course is for students who continue to study General English 1. The course is focused on the ability to actively use in practice most aspects of the Times of English, conditional sentences, phrases in passive collateral, etc. At this stage the student will be able to support the conversation with several interlocutors or express his point of view. The student significantly expands his vocabulary, which will allow him to freely express his thoughts in any environment. At the same time, the speech will be supplemented by various synonyms and antonyms of already familiar words, phrasal verbs and steady expressions.
Course pre-30s: General 1.
Постреквизиты курса: Academic English.

LNG1055
COURSE GOALS AND OBJECTIVES
The main purpose of the Academic English course is to develop academic language skills. Discipline is a language style that is used when writing academic papers (paragraph, abstract, essay, presentation, etc.) This course is designed to help students become more successful and effective in their learning, developing critical thinking skills and self-learning.
Course pre-30s: General 2.
Post-31s of the course: ProfessionalEnglish.

LNG1056
COURSE GOALS AND OBJECTIVES
"Business English" is an English language for business communication, business and career. Knowledge of business English is useful for negotiation and business correspondence, preparation of presentations and informal communication with business partners.
The peculiarities of training are that it is necessary not only to master vocabulary, but also to learn new skills: presentational, communicative, linguistic, professional.
Пререквизиты курса: IELTS score 5.0 и/или Academic English
Постреквизиты курса: Professional English, IELTS score 5.5-6.0

LNG1057
COURSE GOALS AND OBJECTIVES
The "Professional English" course is designed for B2-level students, whose aim is to improve the language competence of students in their respective professional fields. The main purpose of the course is to teach students to work with texts, both audio and written, by specialty. The curriculum is based on the necessary vocabulary (words and terms) often used in English for special purposes. Students will acquire professional English language skills through integrated content and language training, master

vocabulary to read and understand original sources with a high degree of independence, and practice different communication models and vocabulary in specific professional situations.
Course pre-editing: BusinessEnglish.
Post-31s of the course: any elective course.

Information and communication technologies

CODE - CSE174
CREDIT - 3 (2/1/0)
PREREQUISITES - No

COURSE GOALS AND OBJECTIVES

- Learning how to apply modern information technology in the field of professional activities. The course's objectives include:
  - Uncover the basic concepts of computer system architecture;
  - Uncover the basic concepts of information and information technologies and substantive terminology;
  - Teach to work with software interfaces of operating systems;
  - Teach to work with data in a different view, both table structured and unstructured;
  - Teach to apply the basic principles of information security;
  - Uncover the concepts of data formats and media content. Learn how to work with typical media data processing applications. Use modern presentation approaches;
  - Discover the concepts of modern social, cloud and mail platforms, and how to work with them;
  - Learn to use algorithmization and programming techniques to solve business process automation problems

SUMMARY OF THE COURSE

The course contains a training program aimed at leveling students' basic knowledge in the field of information and communication technologies. Contains a complete set of topics, according to the MODEL GOSO Curriculum, with a predominance of nurturing practical data skills, algorithmization and programming. The course is designed to teach students not only basic concepts of architecture and modern infrastructure of information and communication technologies, but also to teach 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, SKILLS, SKILLS AT THE END OF THE COURSE

Students will know:

- Computer device;
- The architecture of computing systems;
- Information and communication technology infrastructure;
- Interfaces of modern operating systems;
- Modern tools for dealing with data of various nature and purpose;

- Types of information security threats, principles, tools, and methods for data protection;
- Python programming language.

Students will be able to:

- Work with the interfaces of modern operating systems;
- Work with state-of-the-art applied software to work with data of a different nature and purpose;
- Apply modern social, cloud, mail platforms to organize business processes;
- Programming in an algorithmic programming language;
- Analyze, model, design, implement, test and evaluate information and communication technology systems

Social & Political Knowledge

CODE - HUM126
CREDIT - 8 (4/0/0/4)
PRE-REQUISIT - no

COURSE GOALS AND OBJECTIVES

This course involves the study of four scientific disciplines - psychology, political science, sociology and cultural studies, each of which has its own subject, terminology and research methods. Interactions between these scientific disciplines are carried out on the basis of the principles of information complementarity; interactivity; the methodological integrity of the research approaches of these disciplines; commonality of results-oriented learning methodology; a unified systematic representation of the typology of learning outcomes as formed abilities. The theoretical sources of this course are the concepts of Western, Russian, 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.

Philosophy

КОД – HUM124

CREDIT - 3 (1/0/2)

PREREQUISITES - The Modern History of Kazakhstan

COURSE GOALS AND OBJECTIVES

The aim of the course is to develop cognitive, operational, communicative, self-forming competencies for solving problems:

- contribute to the development of adequate world-views in the modern world;
- To form creative and critical thinking among students;
- distinguish between the relationship between spiritual and material values, their role in human life, society and civilization;
- to help define one's attitude to life and to find harmony with the world around them.

SUMMARY OF THE COURSE

"Philosophy" is the formation of a holistic worldview, which developed in the context of the socio-historical and cultural development of mankind. Familiarity with the basic paradigms of the methodology of teaching philosophy and education in classical and post classical traditions of philosophy. Theoretical sources of this course are the concepts of Western, Russian, Kazakh yin history and philosophy theory.

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

- Knowing the basic terms, the main concepts and problems of philosophy;
- Knowing the basic philosophical ways to solve ideological issues in the context of culture;
- the ability to analyze the history of philosophical thought development;
- the ability to identify alternative ways of setting and solving world-views issues in the history of human development;
- the ability to identify basic theoretical approaches in the relationship between man and society;
- The ability to master the technique of doing independent work;
- The skills of finding material to organize
- The skills to freely debate and make rational decisions;
- ethical principles in professional activities.

Differential equations in private MatLab derivatives

CODE - MAT106
CREDIT - 3 (1/0/2)
ПРЕРЕКВИЗИТ – Математика I-III

COURSE GOALS AND OBJECTIVES

The purpose of teaching the course is "Differential Equations in Private Derivatives." Matlab" is the formation of basic knowledge on course sections that help analyze, model and solve theoretical and practical problems.
The objectives of the course: to apply the theory of equations in private derivatives to solve and research applied tasks from different fields of natural science, economics, medicine, biology and ecology; to shape perceptions of the implementation of numerical methods to solve regional problems with the use of Matlab

SUMMARY OF THE COURSE

The basic equations of mathematical physics. Classic edge tasks for equations in private derivatives. Analytical and numerical methods of solving classic edge problems. Use Matlab to solve regional problems numerically.

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

- to master this mathematical apparatus, allowing to analyze, model and solve classic boundary problems;
To master the methods of solving classic edge problems;
To be able to pose a problem, to choose methods of solution, both analytically and using computer technologies;
Use the state-of-the-art Matlab software;
To master the methodology and skills of numerical implementation of the mathematical model, analysis of the results, interpretation of them to clarify the model;
- to expand your own mathematical knowledge.

Electrical materials science

CODE - ERG176
CREDIT - 3 (2/0/1)
PREREQUISITES - NO

THE PURPOSE AND TASK OF THE COURSE

- Building knowledge of the principles of the use of electrical materials in electrical and electrical devices.

SUMMARY OF THE COURSE

Classification of electrical materials; dielectrics, their electrical conductivity, breakdown of gases, liquid and solid dielectrics; Thermal conductivity Radiation resistance of materials; Liquid dielectrics; Polymers Inorganic electrical insulation materials; conductor, superconducting and semiconductor materials. Magnetic materials, classification and properties of magnetic materials. The knowledge gained by students in the study of discipline. "Electrical materials science" is necessary for deeper assimilation of subsequent basic and special disciplines.

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

Students will know:

- study of the modern classification of electrical materials and the relationship of their basic characteristics with the structure and processes they process when exposed to electromagnetic field, heat, humidity, chemically aggressive environments and other technological operational factors.

Students will be able to:

- Building a future specialist with high practical skills sufficient for successful manufacturing activities.

The theoretical foundations of electrical engineering

КОД –ELC163
CREDIT - 3 (2/1/0)
PREREQUISITES – Physics I

COURSE GOALS AND OBJECTIVES

Teaching students to choose the theoretical basics of electrical engineering, the principles and methods of calculating electrical circuits, scientific foundations and the modern state of electrical engineering. It deepens and develops the training of engineers who master modern construction and calculation technology, as well as the selection of electricaldevices.

SUMMARY OF THE COURSE

Discipline examines: the basic concepts and definitions used in electrical engineering; Modern methods of modeling electromagnetic processes; Methods for analyzing electrical and magnetic circuits; Numerical methods of analyzing electrical circuits; Basic laws and principles of electrical engineering, properties and characteristics of electrical circuits; Methods for analyzing electrical circuits in established and transitional modes; choose the optimal method of calculation, determine the basic parameters and characteristics of electrical circuits.

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

The course "Theoretical Basics of Electrical Engineering" gives students knowledge about electrical and magnetic phenomena, and their use for practical purposes and provides comprehensive training of future specialists: high professional level, development of creativity, ability to formulate and solve at a high scientific level the problems of the study specialty, the ability to creatively apply and solve problems independently.

Electric devices

CODE - ERG166
CREDIT - 3 (2/1/0)
PREREQUISITE - Electrotechnical material science

THE PURPOSE AND TASK OF THE COURSE

- training a highly qualified specialist who is able to perform the main tasks related to reliable and economical supply of Electric Power Engineering to consumers.

SUMMARY OF THE COURSE

Classification of electric devices and the requirements for them. Electrodynamic forces in electrical devices. Heating electrical appliances. Electrical contacts. Electromagnets. The basics of the theory of burning and extinguishing the electric arc. Insulation of electrical devices. Contactors and magnetic launchers, tyrosir launchers. Controllers, commando-aparats and reostats. Automatic switches and fuses. Electromagnetic relays and voltages. Heat relay, time relay, polarized, index relays. Magnetic amplifiers. Semiconductor electrical vehicles. Automatic high voltage switches. Disconnectors, finishers and short-circuiters. Reactors, dischargers. Measuring power and voltage transformers.

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

Students will know:

- Mastering consumers' Electric Power Engineering requirements;

Students will be able to:

- the ability to develop consumer Electric Power Engineering systems that meet reliable and safe operation.

Laboratory Workshop on Modern Industrial Technologies in Electric Power I

КОД – ERG 422
CREDIT - 3 (0/0/3)
PREREQUISITES - no.

COURSE GOALS AND OBJECTIVES

The goal of teaching discipline is to gain students basic knowledge in the development and design of automation and management software systems.

To examine the tasks solved by the industrial controller in the automated process management systems.

To study the architecture and composition of model series of industrial controllers;

Acquire practical skills in using industrial controllers in the implementation of typical technological controls and controls;

SUMMARY OF THE COURSE

To form a solid foundation of knowledge, a high mathematical culture and practical skills, sufficient for successful production activities and allow him to master new necessary knowledge and achievements in the field of programming and engineering tasks.

KNOWLEDGE, SKILLS, SKILLS AT THE END OF THE COURSE

Learn the methodology of automated software development of automation and management systems.

Learn how to use state-of-the-art software development and design tools, as well as design and regulatory documentation, to acquire skills in building quality automation and management software systems;

Provide theoretical training in software development and design of tools and automation and management systems.

Laboratory workshop on modern industrial technologies in the electric power industry II

CODE-ERG423

CREDIT – 3 (0/3/0)

PREREQUISITES-Laboratory workshop on modern industrial technologies in the electric power industry I

COURSE GOALS AND OBJECTIVES

The purpose of studying the discipline is to develop professional skills for bachelors and undergraduates in a laboratory workshop on modern industrial technologies in the electric power industry, methods for modeling calculation and analysis of transients in electric drives of General industrial mechanisms.

BRIEF DESCRIPTION OF THE COURSE

The discipline "Laboratory workshop on modern industrial technologies in the electric power industry" is one of the main fundamental disciplines that form professional skills in solving problems of bachelors and masters in production, considering the basic principles and methods that are part of Electromechanical systems.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Bachelors and undergraduates acquire the necessary stock of fundamental knowledge on modeling of electric drive systems; stages of installation and adjustment; system approach to installation and adjustment of electric machines;

Bachelors, and undergraduates acquire knowledge of the principles of installation variants for the construction of closed systems of variable frequency drives, count and model the system is asynchronous variable frequency drives, perform full range of tasks associated with the selection of hardware and software, and use software package for simulation and analysis of modern power supply systems of General mechanisms.

Laboratory workshop on modern industrial technologies in the electric power industry III

CODE-ERG424

CREDIT – 3 (1/2/0)

PREREQUISITES-Laboratory workshop on modern industrial technologies in the electric power industry II.

COURSE GOALS AND OBJECTIVES

The purpose of studying the discipline is to develop the

following skills for bachelors: * modern automated frequency electric drive, electromagnetic compatibility;

* selectivity settings for differential relay protection and automation devices;

* ensuring electrical safety during operation of electrical installations.

BRIEF DESCRIPTION OF THE COURSE

The discipline "Laboratory workshop on modern industrial technologies in the electric power industry" is one of the main fundamental disciplines that form the skills of operating an automated frequency electric drive in production, Rsia of electrical installations, electrical safety of the neutral mode of electrical installations, and Power Engineering saving. Ensuring high-quality power supply and electromagnetic compatibility.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Students acquire the necessary stock of fundamental knowledge in the field of regulation and control of ACEP, selection of relay differential devices of Rsia, evaluation of power quality indicators and electromagnetic compatibility of modern installations and mechanisms, analysis of electrical safety maintenance during operation of electrical installations.

Power and electrical equipment

CODE-ERG179
CREDIT – 3 (2/0/1)
PREREQUISITES – no

PURPOSE AND PURPOSE OF THE COURSE

The discipline is the basis for studying specialized disciplines of higher professional education-bachelor's degree. The purpose of studying the discipline "Power and electrical equipment" is to acquire students ' knowledge on the basics and trends of development of electrical engineering and electrical equipment.

BRIEF DESCRIPTION OF THE COURSE

Students acquire knowledge on the basics and trends in the development of electro-mechanics and electrical equipment. Clearly understand the concept of providing consumers with Electric Power Engineering, understand the structure of Electromechanical systems and electrical equipment, the relationship between its various links, get an idea of the composition of Electric Power Engineering consumers in various sectors of the national economy. Questions on the generalized Electromechanical Converter are considered. Device and principles of construction of Electromechanical systems. Laws of electromechanics. Electrical insulation and cable equipment.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

In the course of studying the discipline, students should know:

- understand the practical problems of electrical engineering and electrical engineering;
- shows their connection with special disciplines, processes and technologies in the electric power industry and industries.

Electric machine

CODE-ERG168
CREDIT – 3 (2/1/0)
PREREQUISITES – no

PURPOSE AND PURPOSE OF THE COURSE

develop students ' knowledge and skills in the design and operation of electrical machines and transformers used in industry.

BRIEF DESCRIPTION OF THE COURSE

- the specialist must gain knowledge of the basics of the theory of electric machines and transformers, the principles of their operation, design features, quantitative relationships that characterize the processes that occur during the operation of these machines.

- the specialist must acquire the ability to determine their purpose and operational properties based on the characteristics of electric machines, and correctly and effectively use electric machines and transformers in their work.

- the specialist must acquire skills in the production of installation of electrical circuits for connecting electrical machines and transformers with the implementation of safety regulations, perform calculations of electrical, magnetic systems and characteristics of electrical machines.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

- operating principle and design of various types of electrical machines and transformers;
- physical phenomena occurring in electrical machines and transformers under various operating modes and their mathematical description;
- main characteristics of electrical machines and transformers.
- analyze and describe the physical processes occurring in electric machines;
-use of standards in the field of technical documentation, use of standard terminology.
- selection of electrical machines according to their functionality, to provide the consumer with the necessary accuracy and reliability;
- selection and calculation of electric machines operating in the system,
- mastering theoretical and practical knowledge of the processes of Electromechanical Power Engineering conversion, the design of electric machines, their properties, characteristics, and operating rules.

Transients in power systems

CODE-ERG127
CREDIT – 3 (2/0/1)
PREREQUISITES-Theoretical foundations of electrical engineering

PURPOSE AND PURPOSE OF THE COURSE

Students acquire knowledge of the basics of the theory of transients that occur in power systems. For this course, it is essential, first of all, that the processes occurring in interconnected elements of electrical systems are studied as a whole.

BRIEF DESCRIPTION OF THE COURSE

Basic information about electromagnetic transients. Basic definition. Causes of a short circuit. General instructions for performing short-circuit current calculations. The main assumptions made when calculating a short circuit. General information about Electromechanical transients in electrical systems and processes. Types of transients. Basic considerations on the analysis of electrical system modes. General assessment of the stability of electrical systems. Static stability of the regulated electrical system. The D-partition method. Static stability with ARV of proportional action and strong action. Self-starting of electric motors in power supply systems of industrial enterprises. Frequency and power changes in power systems. Measures to improve the stability and transients of electrical systems of APV.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

In the course of studying the discipline, students should understand the principles of transformation of power system circuits, the impact of transients on the stability of the power system, understanding the processes and methods of analysis that are used in the practice of designing and operating electrical systems. The study of transients is based on the knowledge gained in previous General education courses - the theoretical foundations of electrical engineering, electrical machines, and a number of special courses.

Automated electric drive

CODE-ERG447
CREDIT – 3 (1/1/1)
PREREQUISITES-Electric cars

COURSE GOALS AND OBJECTIVES

Study of the General physical properties of an electric drive as an object of automatic control, its Power Engineering characteristics and the basics of choosing the power of power elements, Electromechanical Power Engineering transformations in an electric drive, methods for solving the equation of motion of electric drives of industrial mechanisms.

BRIEF DESCRIPTION OF THE COURSE

The discipline "Automated electric drive" is a basic subject where students get a General idea of modern electric drive. The main subject of the course: electric drive Mechanics, DC and AC electric Drives. Adjustable electric drive. Transients in the electric drive. Power Engineering characteristics of the electric drive. Design of electric drives for typical industrial mechanisms.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Students will gain knowledge of the physical laws of the basic features of interaction of elements of system of regulation of coordinates of electric drive, transient design and load diagrams of electric drive, choice of power of motors and inverters, Power Engineering parameters of the drive.

Students will acquire skills in calculating and choosing ways to control modern electric drives that ensure resource and Power Engineering saving.

Electrical part of power plants and substations

CODE-ERG164
CREDIT – 3 (1/1/1)
PREREQUISITES-Electric devices

PURPOSE AND PURPOSE OF THE COURSE

Organization of the electric power industry based on the most efficient directions, such as concentration of Electric Power Engineering production by creating large power plants connected to each other and to consumers by an extensive network of power lines, rationalization of the fuel and Power Engineering balance by involving hydroelectric resources, the cheapest and least scarce fuels, especially local ones, as well as optimization of the allocation of productive forces and Power Engineering economy. This will allow you to expand your horizons and deepen the special knowledge of the student.

BRIEF DESCRIPTION OF THE COURSE

Consideration of the design of electrical devices, characteristics and modes of equipment, electrical circuits, methods for limiting short-circuit currents, etc. Calculation and selection of basic data on parameters and characteristics of electric machines, power transformers, electrical devices and conductors, as well as materials for the development of main circuits, circuits for own needs and structures of power plants and substations.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Formation of high practical skills in the future specialist that are sufficient for successful production activities, allowing them to independently master new necessary knowledge about electric power systems, features of technological processes of various types of power plants and substations.

Electric power networks and systems

CODE-ERG178
CREDIT – 3 (1/1/1)
PREREQUISITES-Electric devices

PURPOSE AND PURPOSE OF THE COURSE

- acquisition of knowledge on trends in the development of the electric power industry, principles and methods of transmission and distribution of Electric Power Engineering.
- getting an idea and studying the parameters of replacement circuits for electric grid elements;
- familiarization with the structures of overhead and cable lines;
- determination of power and Power Engineering loss in elements of electric networks;
- master modern methods for calculating the steady-state modes of electric networks on a PC, and also consider issues related to the quality of electric Power Engineering and its security.

BRIEF DESCRIPTION OF THE COURSE

Basic definition. Electrical and power systems, electrical networks. Elements and structures of electric networks Characteristics and parameters of electric network elements. Practical methods for calculating the steady-state modes of electric networks. Determination of power and Power Engineering losses in elements of electric networks. Calculation of a two-way power supply network with different supply voltages, power quality And its provision. Setting the voltage regulation in electrical networks. Ways to change the voltage regulation.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

In the process of studying the discipline, students must understand the concept of providing consumers with Electric Power Engineering, the equivalent circuits of basic network elements, the basic techniques and ratios used to determine the parameters of the mode and the range of regulation of voltage. The discipline focuses the knowledge gained in Power Engineering, theoretical basics of electrical engineering to practical problems of electric power industry, shows their relationship with related disciplines, forms of trained specialists of the main knowledge in the field of transmission and distribution of Electric Power Engineering.

Power supply to enterprises

CODE-ERG448
CREDIT – 3 (1/1/1)
PREREQUISITES – Power and electrical equipment

PURPOSE AND PURPOSE OF THE COURSE

The purpose of discipline is to train a specialist capable of performing the full range of tasks related to the design of individual elements of the system shop Electric Power Engineering and the whole range of issues craft supply, using modern computer technology and introducing new technology in designing.

Objectives of the discipline-study of modern methods for calculating electrical loads at power supply stages with a voltage of up to 1 kV, reactive power compensation with a voltage of up to 1 kV.

BRIEF DESCRIPTION OF THE COURSE

Study of calculation methods, design analysis of shop power supply systems, development of skills for independent solution of engineering problems and practical application of theoretical knowledge, study of the principles of designing power supply systems at the stages of electric loads of industrial enterprises with a voltage of up to 1 kV.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

As a result of studying the discipline, the student should have an idea:

- about the basic principles of building schemes for internal power supply;
- about internal power supply schemes;
- reactive power compensation in networks up to 1 kV.

Know:

- basic requirements applicable to shop floor power supply systems;
- power supply schemes for shop substations;
- classification of power supply networks;
- methods of laying cables, wires and current lines with a voltage of up to 1 kV on the territory of the workshop;
- conditions for selecting electrical equipment with a voltage of up to 1000 V;

Be able to:

- design the shop's power supply system;
- calculate short-circuit currents and select equipment in the network with a voltage of up to 1000 V
- draw up diagrams of in-house power supply.

Lighting equipment and lighting

CODE-ERG120
CREDIT – 3 (2/0/1)
PREREQUISITES – power supply for enterprises

PURPOSE AND PURPOSE OF THE COURSE

Training of a highly qualified specialist who is able to perform the main tasks related to reliable and economical supply of Electric Power Engineering to consumers with its standardized quality, reliability and economy.

BRIEF DESCRIPTION OF THE COURSE

Autonomous power supply systems - as an alternative source of electric Power Engineering. Diesel, wind, and solar power plants. Electric loads of enterprises and modern methods of calculating electric loads fed by Autonomous sources of electric Power Engineering. Reactive power compensation. Distribution of Electric Power Engineering at a voltage of up to 1 kV. Distribution of Electric Power Engineering at a voltage above 1 kV. Shop transformer, main step-down, distribution and conversion substations. The quality and parameters of Electric Power Engineering. Electric Power Engineering metering. Selection of electrical equipment. Selection of types of wiring, brands of wires and cables, selection of the optimal scheme of external and internal power supply, design of grounding.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Mastering the requirements of consumers for power supply, the ability to develop power supply systems for consumers that meet reliable and safe operation, providing high-quality voltage for electric Power Engineering

receivers

Calculation and design of electric power networks and systems

CODE-ERG136
CREDIT – 3 (2/0/1)
PREREQUISITES – Electric power networks and systems

PURPOSE AND PURPOSE OF THE COURSE

Students acquire knowledge on trends in the development of electric power networks and systems, principles and methods of transmission and distribution of Electric Power Engineering. Students get an idea and study the parameters of replacement circuits for electrical network elements, determine power losses, voltage and Power Engineering losses in electrical network elements, calculate and select voltage, power flows, wire cross-sections and power of substation transformers, master methods for calculating steady-state modes of electrical networks, and also consider issues related to voltage regulation and reactive power compensation.

BRIEF DESCRIPTION OF THE COURSE

Basic definition. Selection of the rated network voltage. Selection of wire sections. Drawing up a power line replacement scheme for calculating the steady-state mode and determining its parameters. Selection of substation transformers. Parameters of transformers. Losses in transformers. Calculations and analysis of operation modes of closed and open electric networks. Technical and economic calculations in electric networks of power systems. Mechanical calculation of wires and cables. Choice of supports and spans.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

In the process of studying the discipline, students must understand the concept of providing consumers with Electric Power Engineering, the equivalent circuits of basic network elements, the basic techniques and ratios used to determine the parameters of the mode and the range of regulation of voltage. The discipline focuses the knowledge obtained in the electric power industry, electric power networks and systems, transients in power systems on practical problems of the electric power industry, shows their connection with related disciplines, and forms specialized knowledge in the field of transmission and distribution of Electric Power Engineering among trained specialists.

Calculation and design of power supply systems

CODE-ERG139
CREDIT – 3 (2/0/1)
PREREQUISITES - power supply of enterprises

COURSE GOALS AND OBJECTIVES

Training of a highly qualified specialist who is able to perform the main tasks related to reliable and economical supply of Electric Power Engineering to consumers with its standardized quality, reliability and economy.

BRIEF DESCRIPTION OF THE COURSE

Methods for calculating electrical loads, calculating reactive power compensation, drawing up diagrams of shop and in-plant networks, studying issues related to calculations of power supply to consumers with a specific load.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

- mastering the requirements of consumers for power supply;
- ability to develop power supply systems for consumers;
- satisfying reliable and safe operation, providing high-quality voltage for electric Power Engineering receivers.

Calculation and design of an automated electric drive

CODE-ERG135
CREDIT – 3 (2/0/1)
PREREQUISITES-Automated electric drive

PURPOSE AND PURPOSE OF THE COURSE

Acquisition of knowledge, skills and abilities in design, calculation, research and operation of an automated electric drive system for typical industrial installations and complexes of continuous and cyclic operation with various types of load on the engine shaft.

BRIEF DESCRIPTION OF THE COURSE

Automated electric drives of typical industrial installations and complexes (excavators, drilling rigs, electric locomotives, conveyors, fans, pumps, compressors and lifting units) are considered. The main issues of the electric drive and its operating conditions are described. For the considered working machine, the operating modes are given and the requirements for its electric drive are determined. Possible schemes of the electric drive and ways of its automation for realization of the requirements imposed to it are given. The method of calculation and selection of the main elements of the electric drive, as well as their typical schemes, is described.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Students should have a clear understanding of the principles of operation and design capabilities of typical industrial mechanisms and installations; the main characteristics of electric drives of continuous and cyclic installations; methods for regulating the coordinates of the electric drive of specific installations, depending on their belonging to groups of mechanisms; Electromechanical and operational characteristics of DC and AC electric drive systems of various installations.

Basics of electrical safety

CODE-ERG124
CREDIT – 3 (1/1/1)
PREREQUISITES – power supply for enterprises

PURPOSE AND PURPOSE OF THE COURSE

Students receive knowledge about the legislation in the field of safety and the causes of electrical injuries in industrial enterprises, knowledge of the main protective measures and means of electrical safety in General-purpose electrical installations and basic requirements for electrical personnel, as well as first aid measures when personnel receive an electric injury.

BRIEF DESCRIPTION OF THE COURSE

Organization of TB and responsibility for violation of TB. Electrical injuries, classification, types and act of investigation of electrical injuries, ways to reduce electrical injuries. Effects of electric current on the human body and the degree of danger. Parameters of the electrical circuit, the effect of voltage, current, frequency, time of action, resistance of the human body and the current loop on the severity of the outcome of electric injuries. The state Committee for standardization on electrical safety. Danger of networks with grounded and isolated neutral. Risk of ground fault. Protective measures, the role of isolation. Application of low voltages, safety interlocks, protection during the transition of the highest voltage to the lowest network. Protective shutdown and automatic capacity compensation. Electric protective equipment, assistance in case of electric shock.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

As a result of studying the discipline, students should be able to use individual means of protection against electric shock and check their serviceability, provide first aid to victims of electric current, check the compliance of electrical installations with electrical and industry rules in terms of electrical safety requirements, and draw up operational documents.

Superchargers and heat engines

CODE-ERG194
CREDIT – 3 (2/0/1)
PREREQUISITES-Theoretical foundations of heat engineering

COURSE GOALS AND OBJECTIVES

Course goal: the main objectives of the discipline are to familiarize with the theoretical foundations and principles of operation of superchargers and heat engines (TD), their design, characteristic modes and technical and economic indicators of their operation. Students should acquire the knowledge and skills necessary for free orientation in the practice of operation and design of hydraulic and power generating systems containing superchargers, etc.

BRIEF DESCRIPTION OF THE COURSE

The course "Superchargers and heat engines" examines pumps, compressors, the principle of their operation, as well as the operation of heat engines, which include gas and steam turbines. During the course, students are introduced to the principles of their work and methods of their calculation.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

As a result of studying the discipline, students should have an idea of:

- the operating conditions of the main elements of superchargers and heat engines;
- on the design principles of superchargers and heat engines;
- about the technology of manufacturing machine parts;
- on the control structure of superchargers and heat engines.

know:

- the essence of the theory of blade machines (fans, superchargers, compressors, turbines);
- structural design of superchargers, steam and gas turbines;
- thermal and strength processes in the flow parts and parts of shovel machines and the basics of their calculation; be

able to:

- calculate and select superchargers and heat engines depending on their purpose;
- evaluate the efficiency and reliability of superchargers and heat engines;
- perform thermal and strength calculations of superchargers and heat engines.

possess:

- methods of verification and design calculations of superchargers;
- ways to upgrade existing equipment;

- the method of selecting superchargers for the network, parallel and sequential operation.

Technical thermodynamics

CODE-ERG153
CREDIT – 3 (2/0/1)
PREREQUISITES-Physics I, II course

GOALS AND OBJECTIVES

Purpose of the course: the purpose of studying the discipline "Technical thermodynamics" is to train specialists in the application of thermodynamic methods for process analysis in order to ensure reliable and efficient operation of heat and power and heat-mechanical equipment.

BRIEF DESCRIPTION OF THE COURSE

The course "Technical thermodynamics" examines the processes associated with the thermal processes of heat power plants and is part of the basic cycle of higher professional education disciplines in the specialty 5B071700 - "heat power".

KNOWLEDGE, SKILLS, SKILLS AT the end of the COURSE

Master thermodynamic methods for analyzing the stability of the state of thermodynamic systems, study the thermodynamic properties of substances, master the methods of analysis and optimization of cycles, get an idea of methods for converting thermal Power Engineering into electrical and mechanical Power Engineering.

As a result of studying this discipline, students should:

have an idea of: the

Principles of operation of heat and cooling machines, schemes of thermal power plants, gas turbine plants and steam power plants;

Know the basic laws and concepts of thermodynamics; thermophysical characteristics of bodies and media; equations of interrelation of system parameters.

Be able to use the basic principles and laws of thermodynamics for process analysis; use tables and diagrams in the analysis of processes and cycles to acquire practical skills in calculating heat and working in thermodynamic cycles, expiration, compression and efficiency of cycles.

Calculation and design of heat and mass transfer equipment

CODE-ERG137
CREDIT – 3 (2/0/1)
PREREQUISITES – Fundamentals of theory of combustion fuel and the combustion device

COURSE GOALS AND OBJECTIVES

Purpose of the course: the purpose of studying the discipline "Calculation and design of heat and mass transfer equipment" is to train specialists in the field of thermodynamics and heat transfer methods for analyzing the processes of heat and mass transfer equipment of thermal power plants and other industrial enterprises.

BRIEF DESCRIPTION OF THE COURSE

"Calculation and design of heat and mass transfer equipment" examines the processes of heat and mass transfer in heat power equipment and installations. These include boiler installations, waste heat boilers, and heat exchangers of various pressures.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Master knowledge in the field of heat and mass transfer, which is based on the course "theoretical foundations of heat engineering".

Students should have an understanding of:

Principles of operation schemes of combined-cycle gas installations, in particular waste heat boilers, gas-gas, gas-water and other types of heat exchangers;

Know the basic laws and concepts of heat and mass transfer; thermophysical characteristics of bodies and media; equations of interrelations of system parameters.

Be able to use the basic provisions and laws of heat engineering to analyze heat exchange processes; use tables and diagrams, calculate the efficiency of the cycle based on heat exchange processes.

Fundamentals of the theory of fuel comdustion and firebox devices

CODE-ERG123

CREDIT – 3 (2/0/1)

PREREQUISITES-heat and mass Transfer equipment of enterprises

COURSE GOALS AND OBJECTIVES

Course objective: The purpose of studying the discipline "Fundamentals of the theory of fuel combustion and combustion devices" is to train specialists with knowledge of complex combustion processes, including both chemical and physical processes. Familiarization with the processes of fuel combustion in large power plants.

DESCRIPTION OF THE COURSE

"Fundamentals of the theory of fuel combustion and combustion devices" examines the combustion processes of liquid, solid and gaseous fuels, as well as the accompanying conditions for optimal combustion. Devices that provide combustion of various types of fuels are considered.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Master knowledge in the field of burning various fuels, ensuring optimal Gorenje, various devices in the form of burners, furnaces.

STUDENTS SHOULD HAVE AN IDEA THAT:

The Principles of operation of fuel-burning devices, their main design features. Features of combustion of fuels of various aggregate state. Gorenje Gorenje chemical processes, conditions of optimal combustion..... Torch, a combustion zone, oxidizing agents.

Industrial electronics

CODE-ERG131
CREDIT – 3 (2/1/0)
PREREQUISITES-Physics II

COURSE GOALS AND OBJECTIVES

Familiarizing students with the basic information about industrial electronics, their application and developing students ' skills to work with them.

BRIEF DESCRIPTION OF THE COURSE

As a result of mastering the discipline "Industrial electronics", students will

know:

- the basic element base of electronics;
- the principle of operation of the main electronic devices;
- characteristics of electronic devices;
- device of electronic converters;

Be able to:

- read electronic circuits;
- perform basic calculations of electronic devices;
- collect circuits of electronic converters;

possess:

- methods for calculating the most common electronic devices;
- skills in working with electronic converters.

Modeling in Power Engineering systems

CODE-ERG431
CREDIT – 3 (2/1/0)
PREREQUISITES – no

COURSE GOALS AND OBJECTIVES

Familiarization of students with the main elements of electric power systems (ESS) and their mathematical and virtual models, formation of students ' skills in modeling electric power objects in the MATLAB software environment.

BRIEF DESCRIPTION OF THE COURSE

The course covers the following main topics: modeling of single-phase and three-phase power transformers, modeling of DC machines in generator and motor modes, modeling of asynchronous machines in generator and motor modes, modeling of synchronous machines in generator and motor modes, modeling of power lines, load modeling, modeling of switching devices.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

As a result of mastering the discipline "Modeling in Power Engineering systems", the student will:

know:

- methods of EES modeling;
- the principle of operation of the main elements of the EES;
- mathematical models of the main equipment of the power plant;
- methods for regulating the parameters of the EES mode;

be able to:

- work in the MATLAB software environment;
- calculate parameters of the main electrical equipment;
- collect the object model of the EPS;
- explore the modes of the EES;

possess:

- methods for regulating parameters of electrical equipment;
- skills of work with schemes of the EPS.

Operation of TPP equipment

CODE-ERG163
CREDIT – 3 (2/0/1)
PREREQUISITES-Superchargers and heat engines

COURSE GOALS AND OBJECTIVES

The discipline "Operation of TPP equipment" is part of the cycle of specialized disciplines and is a course of choice for bachelors of higher educational institutions studying in the specialty 5B071700 - "heat power Engineering".

The course "Operation of TPP equipment" occupies an important place among General technical disciplines that determine the theoretical level of professional training of specialists in the modern training system. The main objectives of the course are the formation of knowledge in the field of operation of heat supply equipment; mastering the skills of evaluating the functional, quantitative and qualitative characteristics of heat supply devices.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

As a result of studying this discipline, students should: have an idea of:

- operating conditions of the main elements of steam boilers, steam and gas turbines during operation;
- the structure of management of work the main equipment of thermal power plants;
- basic data on reliability and reasons for its decline in the operation of TPP power equipment;

know:

- fundamentals of the theory of installation and operation of TPP equipment;
- operating modes of boiler units, steam and gas turbines;
- the procedure for starting and stopping boiler installations and processes that affect the rational management of start-up and stop modes;
- fundamentals of organization and management that ensure trouble-free operation of the boiler plant and auxiliary equipment at a given performance with minimal losses;
- fundamentals of the theory of heat transfer in turbomachines under transient modes of operation;
- starting schemes of turbomachines;
- technology for starting, stopping, and servicing turbomachines and their auxiliary equipment.

be able to:

- analyze the technical condition of the main equipment of thermal power plants;

to evaluate the efficiency and reliability of the main equipment of thermal power plants;

- operate heat engines and units;

acquire practical skills:

- acquire skills in drawing up technological processes for the repair and installation of heat and power equipment.

Renewable Power Engineering

CODE-ERG107
CREDIT – 3 (2/0/1)
PREREQUISITES – Power and electrical equipment

COURSE GOALS AND OBJECTIVES

Are to teach students the theory, methodology and practice of using fuel and Power Engineering resources to train a new generation of specialists in the field of rational and efficient use of natural resources.

BRIEF DESCRIPTION OF THE COURSE

Study of the physical nature of the processes of converting renewable Power Engineering sources (RES) into electric Power Engineering and the implementation of the most economical and safe operating conditions for power plants based on RES.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

- to form basic knowledge about renewable (alternative) sources formation of the ability to generalize, analyze, perceive information, set goals and choose ways to achieve it.

Assistance in forming a graduate's readiness to:

- perform Power Engineering calculations;
- develop technical documentation and methodological materials.

Formation of graduates ' readiness to conduct technical and economic analysis, comprehensive justification of decisions taken and implemented in the field of operation of power plants based on RES; application of results in practice, striving for self-development, improving their skills and skills

- efficiently apply technological processes and methods of Electric Power Engineering production and transmission; master the methodology for calculating the design and optimal analysis of power supply systems, master knowledge and practical skills for reliable and safe operation of electrical equipment operating on the basis of renewable Power Engineering sources.

Power Engineering audit and Power Engineering saving at enterprises

CODE-ERG180
CREDIT – 2 (1/0/1)
PREREQUISITES – no

COURSE GOALS AND OBJECTIVES

to teach students the theory, methodology and practice of improving the efficiency of fuel and Power Engineering resources to train a new generation of specialists in the field of rational and efficient use of natural resources.

The program of the discipline provides for lectures and practical classes.

BRIEF DESCRIPTION OF THE COURSE

The discipline "Power Engineering Audit and Power Engineering saving at enterprises" is a profile discipline for the specialty 5B071700-heat power Engineering, 5B071800-electric power engineering in accordance with the working curriculum.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

- develop basic knowledge about renewable (alternative) Power Engineering sources, Power Engineering efficiency, Power Engineering saving in production and consumption;
- contribute to the formation of students ' understanding of sustainable development of the state through Power Engineering efficiency, Power Engineering conservation and the use of renewable Power Engineering sources;
- develop competencies for decision-making at all levels of use of fuel and Power Engineering resources;
- prepare a competitive personality who is ready to actively participate in the social, economic and political life of the country, and is able to make responsible decisions.

As a result of studying the discipline "Power Engineering Audit and Power Engineering saving at enterprises", students should know:

- options for using renewable Power Engineering, ensuring Power Engineering efficiency, Power Engineering saving and preventing climate change;
- legislation of the Republic of Kazakhstan on Power Engineering audit and Power Engineering saving at enterprises;
- new generation of equipment and technologies;

be able to:

- analyze measures to save fuel and Power Engineering resources, identifying benchmarks and prospects for Power Engineering supply, including the use of

renewable Power Engineering, Power Engineering efficiency and Power Engineering conservation based on world achievements;

- effectively use fuel and Power Engineering resources and develop possible ways to improve the Power Engineering system;
- analyze the situation in various aspects of sustainable development: technological, environmental, economic;
- develop evaluation criteria for Power Engineering efficiency and Power Engineering saving in technological processes and consumption of fuel and Power Engineering resources;
- set specific tasks and priorities in environmental and Power Engineering-saving activities and use the knowledge gained to solve them.

Heat and mass transfer equipment of the enterprise

CODE-ERG122
CREDIT – 3 (2/0/1)
PREREQUISITES-Physics I, II course

GOALS AND OBJECTIVES

Purpose of the course: the purpose of studying the discipline "heat and mass Transfer equipment of enterprises" is to train specialists in the application of thermodynamics and heat transfer methods for analyzing the processes of heat and mass transfer equipment of thermal power plants and other industrial enterprises.

BRIEF DESCRIPTION OF THE COURSE

"Calculation and design of heat and mass transfer equipment" examines the processes of heat and mass transfer in heat power equipment and installations. These include boiler installations, waste heat boilers, and heat exchangers of various pressures.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Master knowledge in the field of heat and mass transfer, which is based on the course "Theoretical foundations of heat engineering".

STUDENTS SHOULD HAVE AN IDEA THAT:

Principles of operation schemes of combined-cycle gas installations, in particular waste heat boilers, gas-gas, gas-water and other types of heat exchangers;

Know the basic laws and concepts of heat and mass transfer; thermophysical characteristics of bodies and media; equations of interrelations of system parameters.

Be able to use the basic provisions and laws of heat engineering to analyze heat exchange processes; use tables and diagrams, calculate the efficiency of the cycle based on heat exchange processes.

Theoretical foundations of heat engineering

CODE-ERG147
CREDIT – 3 (2/0/1)
PREREQUISITES-Electrical materials science

COURSE GOALS AND OBJECTIVES

The discipline "Theoretical foundations of heat engineering" aims to give students extensive knowledge of the basic provisions and laws of thermodynamics, modern methods of analysis and calculation of thermodynamic processes and cycles of heat power plants, the fundamental laws and methods of analysis and calculation of heat and mass transfer processes, to develop practical skills in determining the characteristics of heat and mass transfer processes of heat power and heat technological installations and systems.

BRIEF DESCRIPTION OF THE COURSE

The discipline "Theoretical foundations of heat engineering" is included in the cycle
basic disciplines and is a mandatory component for bachelors of higher educational institutions studying in the specialty 5B071700 - "heat power Engineering".

KNOWLEDGE, SKILLS, SKILLS at the END of the COURSE

Master knowledge in the field of heat and mass transfer, technical thermodynamics, and various types of heat exchange.

STUDENTS SHOULD HAVE AN IDEA THAT:

- the subject, research methods and applications of technical thermodynamics;
- about the technological scheme of thermal power stations and the main heat technologies;
- about the principles of operation of heat engines and installations;
- about the principles of operation of heat transformers;
- about heat recovery;
- on the phenomena of momentum, heat, and mass transfer;
- solutions of the heat conduction equation and the simplest system of convective heat transfer equations in a homogeneous medium with constant thermophysical properties under various conditions of unambiguity;
- solutions of problems of convective heat exchange by methods of thermal boundary layer, similarity of heat exchange phenomena, relaxation, finite differences and elements of physical analogies and modeling of heat exchange processes;

- on heat and mass transfer during phase transitions and chemical transformations;
- on the basic concepts and laws of mass transfer and triple analogy;
- on radiant heat exchange, methods for calculating the resulting radiant flux;
- about heat transfer, methods of transfer intensification and calculation of heat exchangers;
- about Power Engineering and environmental problems of heat use;
- about modern scientific research in the field of heat engineering.

Heat engines and gas turbines

CODE-ERG409
CREDIT – 3 (2/0/1)
PREREQUISITES-Superchargers and heat engines

COURSE GOALS AND OBJECTIVES

The discipline "Heat engines and GTU" aims to give students knowledge about heat engines, their design, operating principles, and systems for ensuring optimal modes. The main heat engines are steam turbines and internal combustion engines. Gas turbines are separately removed. Students should be familiar with the design and operating principles of GTU.

BRIEF DESCRIPTION OF THE COURSE

In the discipline "Heat machines and gas turbine engines" students study the theory of blade machines (fans, superchargers, compressors, turbines), the structural design of superchargers, steam and gas turbines, thermal and strength processes in the flow parts and parts of blade machines and the basics of their calculation. Students should acquire the knowledge and skills necessary for free orientation in the practice of operating superchargers in production.

KNOWLEDGE, SKILLS AT THE END OF THE COURSE

Master knowledge in the field of heat and mass transfer, technical thermodynamics, and various types of heat exchange.

STUDENTS SHOULD HAVE AN IDEA THAT:

As a result of studying the discipline, students should have an idea of:

- the operating conditions of the main elements of superchargers and heat engines;
- on the design principles of superchargers and heat engines;
- about the technology of manufacturing machine parts;
- on the control structure of superchargers and heat engines;

Know:

- the essence of the theory of shovel machines;
- structural design of superchargers, steam and gas turbines;
- thermal and strength processes in the flow parts and parts of shovel machines and the basis of their calculation;

Be able to:

- calculate and select superchargers and heat engines depending on their purpose;
- evaluate the efficiency and reliability of superchargers and heat engines;

- perform thermal and strength calculations of superchargers and heat engines.

Possess:

- methods of verification and design calculations of superchargers;
- ways to upgrade existing equipment;
- the method of selecting superchargers for the network, parallel and sequential operation.

Defense of a thesis/graduation project

CODE-ESA 103
CREDIT – 6
PREREQUISITES – no

COURSE GOALS AND OBJECTIVES

Diploma design (completion of a thesis) is the final stage of students ' education at the University and has as its goal:

- systematization, consolidation and expansion of theoretical and practical knowledge in the field of development and design of heat and power systems, application of this knowledge in solving specific scientific, theoretical, economic and production problems that arise during the creation and operation of modern Power Engineering facilities;
- development of skills for independent work, development of
research and experimentation techniques for solving problems and questions developed in the diploma project on various Power Engineering systems;
- finding out the students ' readiness for independent work in the conditions of modern production, progress of science, technology and culture.

BRIEF DESCRIPTION

In the Capstone project student self-selected learning paths (thermal power or electrical power) designs a specific Power Engineering system with the definition of the structure of the tasks, their mathematical formulation, engineering analysis of selected Power Engineering systems, the choice of electric or thermal plant and equipments, performing the graphic part in the form of thermal or electrical schematics, and drafting of the explanatory note to the project.

In the research-based thesis, the student conducts research on the issues of modeling an Power Engineering object and developing control systems with the obligatory mathematical formulation of the problem, development or selection of algorithms for its solution, and experimental verification of the proposed solutions on a computer or object. The thesis can be theoretical or experimental. At the discretion of the head of the thesis, in the first case, it is allowed to reduce the calculation and graphic part with the replacement of some drawings with posters illustrating theoretical calculations; in the second case, part of the drawings can be replaced with graphs, diagrams, tables, etc., revealing the content of the experimental results obtained

KNOWLEDGE, SKILLS, and SKILLS at the END

Diploma project (work) is a final work, based on the protection of which the State attestation Commission decides whether to assign a bachelor's degree in the field of "electrical Engineering and Power Engineering"to a student.

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