Ministry of Agriculture of the Republic of Kazakhstan
NCJSC «Kazakh Agrotechnical Research University named after S. Seifullin»

APPROVE
Chairman of the Board - Rector
NCJSC «Kazakh Agrotechnical
Research University
named after S.Seifullin»

_____ Tireuov K.M.

Protocol No 10 «28» 06 2024 y.

EDUCATIONAL PROGRAM
«6B07101 Thermal Power Engineering»

The code and classification of the field of education
6B07 Engineering, Manufacturing and Civil engineering
The code and classification of the training areas
6B071 Engineering and engineering trades
Code in the International standard classification of education:
0710
Degree/qualification awarded:
Bachelor of Engineering and Technology in the educational program «6B07101 Thermal Power Engineering»

Astana 2024

Academic Committee:

№	S.N.M.	Academic degree, academic title	Post	Place of work	Signature
1	Isenov S.S.	Candidate of Technical Sciences, Associate Professor	Dean of the Faculty of Energy	NCJSC "KATRU named after S.Seifullin"	
2	Mergalimova A.K.	PhD, Associate Professor	Head of the Department of Thermal Power Engineering	NCJSC "KATRU named after S.Seifullin"	
3	Anuarbekov M.A.	Master of Engineering Sciences	Senior Lecturer of the Department of Thermal Power Engineering	NCJSC "KATRU named after S.Seifullin"	
4	Isataeva A.K.	Master of Engineering Sciences	Advisor of the Department of Thermal Power Engineering	NCJSC "KATRU named after S.Seifullin"	

Agreed with representatives of employers:

№	S.N.M.	Post	Place of work	Signature, seal
1	Tanyrbergenov N.M.	Director	«Kyrulus Group Company» LLP	

The Academic Committee was approved by the order of the Chairman of the Board-Rector of NCJSC " KATRU named after S.Seifullin"

No 344 from "18" 10 2023 y.

Educational program: 6B07101 Thermal Power Engineering
(the cipher and the name of the program)

Reviewed on:

at the meeting of the Department of Thermal Power Engineering

Protocol No. 11 from "18" 06 2024 y.

at the meeting of the Faculty Council on Academic Quality

Protocol No. 16 from "21" 06 2024 y.

at the meeting of the Academic Council of the University

Protocol No. 10 from "24" 06 2024 y.

Date of EP passport updating «2» august 2024 y.

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1 Passport of the educational program

1.1 The purpose of the educational program

Training of qualified specialists in demand in the labor market, possessing scientific, pedagogical and professional competencies in accordance with the requirements of the National Qualifications Framework and the Sectoral Qualifications Framework of the Republic of Kazakhstan, to carry out professional activities within the framework of ensuring the quality functioning and improvement of facilities for thermal power engineering.

The objectives of the educational program are the formation of an OP on the energy of thermal technology, including extensive knowledge and skills in the field of energy efficiency of thermal technology and efficient use of fuel.

The general goals and objectives of the educational program are specified in the following sections described.

The formed educational outcomes

ON1 To be able to apply the knowledge of the main and auxiliary equipment of energy production in the calculation, design, experimental and research activities.

ON2 To possess basic mathematical, natural science knowledge in an interdisciplinary context for solving heat and electrical problems.

ON3 To possess knowledge of environmental laws in complex engineering activities for the production and distribution of energy, where it is necessary to use: new efficient energy and resource-saving technologies at energy enterprises, renewable energy sources in thermal power engineering.

ON4 To know professional competencies in solving practical problems in the field of operational, production, technological and installation and repair activities and the influence of the water-chemical regime on the operational characteristics of heat and power equipment.

ON5 To know the basics of thermal engineering, fluid and gas mechanics, thermal measurements, structural materials for solving engineering problems in the professional field with an understanding of the general principles, structure and functioning of thermal systems, setting and solving problems of energy engineering.

ON6 To be able to form competencies in the field of economics and law, the foundations of an anti-corruption culture, ecology and life safety, as well as entrepreneurial skills, leadership and receptivity to innovation in solving professional problems.

ON7 To know the culture of thinking, be able to analyze and interpret information, develop ideas and critical arguments, practice skills to improve performance and physical stability. Be able to communicate effectively orally and in writing, including in a foreign language, in a professional environment and society, be prepared for effective and stress-resistant work in a team.

ON8 To possess theoretical and practical knowledge to solve educational, practical and professional tasks in the field of study; know the basics and methods of scientific research and academic writing and apply them in the field of study; understand the implications of the principles and culture of academic integrity.

ON9 To be able to apply information and communication technologies, applied software for designing, modeling, optimizing thermal power facilities in professional activities.

Compliance of the EP with professional standards of the Republic of Kazakhstan:

1. Professional standard. Energy audit, Approved by the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 130 dated 06/27/2019 - 30 p.

2. Professional standard "Installation and operation of gas supply systems". Appendix No. 1 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated 12/19/2018 No. 344.

3. Professional standard. Operation and repair of boiler-turbine equipment, Appendix No. 20 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated 08/07/2023 No. 125.

4. Professional standard. Operation of heat supply systems, Appendix No. 22 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated 26.12.2019 No. 262.

5. Professional standard. Planning of heating network modes, Appendix No. 48 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated 20.12.2022 No. 239. - 8 p.

6. Professional standard. Gas transportation management. Appendix No. 36 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated 07.08.2023 No. 125.

7. Professional standard. Adjustment of heat supply systems, Appendix No. 19 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated 26.12.2019 No. 262.

Compliance of Atlas of new professions with the EP:

1. Reactor equipment engineer;
2. Developer-designer of electric and thermal energy storage devices;
3. Renewable energy operational dispatcher.

2 General characteristics of the educational program (relevance, features, competitive advantages, uniqueness, stakeholders, etc.)

Currently, the rapid development of industry and energy dictates its requirements, and the general renewal of technological installations requires their careful operation. The efficient use of energy and renewable resources is a continuous and constant necessity. Due to the fact that 85% of electricity in Kazakhstan is generated at coal-fired thermal power plants, the need for training in this field will be constantly high. In addition, today it is difficult to imagine life without heat, electricity and hot water supply. In this regard, the purpose of the educational program is to create a future competent specialist in thermal power engineering and thermal engineering.

The educational program has been developed in accordance with the National Qualifications Framework, coordinated with the Dublin Descriptors and the European Qualifications Framework.

This educational program consists of 3 cycles: 1) General education disciplines - OOD; Basic disciplines-DB; Core disciplines-PD. The educational program is developed on the basis of a modular system, and consists of 16 modules that form general cultural and professional competencies. During the entire course of study, the student will accumulate 213 credits of theoretical and 19 credits of practical training (educational practice - 1, industrial practice - 8, pre-graduation practice - 10), 8 credits for final certification.

The subjects of the bachelor's professional activity in the educational program 6B07101 - "Thermal Power engineering" are systems:

- thermal power plants;
- industrial and heating boilers;
- heat technology;
- centralized and autonomous power supply to industrial enterprises and organizations;
- production and distribution of energy carriers;
- heating and heating networks;
- preparation of water and fuel;
- automated management of thermal power engineering and heat technology facilities;
- as well as methods and tools for modeling and optimizing heat power and heat technology facilities, basic and auxiliary equipment, processes and devices of heat technology, electrical machines and devices.

3 Competence model (portrait) graduate

3.1 Areas of professional activity

The field of professional activity of the bachelor is thermal power engineering as an integral part of technology, which includes a set of tools, methods and methods of human activity created to generate and apply heat, control its flows and convert various types of energy into heat.

3.2 Types of professional activity

The types of professional activity of the graduate are:

- energy systems and complexes;
- energy supply systems for engineering facilities and industries;
- power supply systems for industrial enterprises;
- energy supply systems for autonomous facilities;
- power plants;
- energy installations and complexes based on non-traditional and renewable energy sources;
- thermal technological schemes of production;
- technological installations for the production, distribution and use of heat;
- steam and hot water boilers for various purposes, steam generators of nuclear power plants;
- steam and gas turbines, power units;
- installations for the production of compressed and liquefied gases, compressor,

refrigeration and cryogenic installations, installations of air conditioning systems, heat pumps;

- installations, systems and complexes of high-temperature and thermal humidity technologies, chemical reactors;
- auxiliary heat engineering equipment, heat and mass transfer devices for various purposes;
- heating networks;
- installation of air conditioning of heat carriers and working bodies;
- process fluids, gases and vapors;
- melts, solid and loose bodies as heat carriers and working bodies of power and technological installations;
- fuel and oils;
- fuel and oil preparation systems;
- installations, systems and complexes for the preparation and use of water of standardized quality;
- technological installations for the preparation and use of water from thermal and nuclear power plants: pretreatment equipment, ionite and membrane installations, technological installations for the preparation and use of water from heating networks and heating consumers;
- recycling water supply systems;
- wastewater treatment plants, systems and complexes;
- installations, systems and complexes for the preparation and use of water in the food industry;
- technological equipment for the preparation and use of water for evaporative and steam conversion plants;
- automatic control and management systems for heat and electric technological processes, installations, systems and complexes;
- normative and technical documentation and standardization systems, methods and means of testing equipment and quality control of manufactured products.

3.3 General education competencies

1) aimed at forming the ideological, civic and moral positions of a future specialist, competitive on the basis of knowledge of information and communication technologies, building communication programs in the state, Russian and foreign languages, focusing on a healthy lifestyle, self-improvement and professional success;

2) form a system of general competencies that ensure the socio-cultural development of the personality of a future specialist based on the formation of his ideological, civic and moral positions;

3) develop the ability to interpersonal social and professional communication in the state, Russian and foreign languages;

4) contribute to the development of information literacy through the mastery and use of modern information and communication technologies in all areas of their lives and activities;

5) Form lifelong self-development and education skills;

6) form a personality capable of mobility in the modern world, critical thinking and physical self-improvement. The student should know the methods of scientific research and academic writing and apply them in the field of study.

3.4 Basic competencies

1) to evaluate the surrounding reality on the basis of worldview positions formed by knowledge of the fundamentals of philosophy, which provide scientific understanding and study of the natural and social world by methods of scientific and philosophical cognition;

2) interpret the content and specific features of the mythological, religious and scientific worldview;

3) to argue your own assessment of everything that is happening in the social and industrial spheres;

4) to show a civic position based on a deep understanding and scientific analysis of the main stages, patterns and peculiarities of the historical development of Kazakhstan;

5) to use methods and techniques of historical description to analyze the causes and consequences of events in the modern history of Kazakhstan;

6) to assess situations in various fields of interpersonal, social and professional communication, taking into account basic knowledge of sociology, political science, cultural studies and psychology;

7) synthesize knowledge of these sciences as a modern product of integrative processes;

8) to use scientific methods and techniques of research of a specific science, as well as the entire socio-political cluster;

9) to develop their own moral and civic position;

10) to operate with the social, business, cultural, legal and ethical norms of the Kazakh society;

11) demonstrate personal and professional competitiveness;

12) to put into practice knowledge in the field of social sciences and humanities, which is internationally recognized;

13) to make the choice of methodology and analysis;

14) summarize the results of the study;

15) synthesize new knowledge and present it in the form of humanitarian socially significant products;

16) to engage in communication in oral and written forms in Kazakh, Russian and foreign languages to solve the problems of interpersonal, intercultural and industrial (professional) communication;

17) to use language and speech tools based on a system of grammatical knowledge; to analyze information in accordance with the communication situation;

18) evaluate the actions and deeds of the communication participants.

19) to use various types of information and communication technologies in personal activities: Internet resources, cloud and mobile services for the search, storage, processing, protection and dissemination of information;

20) to build a personal educational trajectory throughout life for self-development and career growth, to focus on a healthy lifestyle to ensure full-fledged social and professional activities through methods and means of physical culture.

3.5 Professional competencies

1. be able to independently solve issues related to:

- collection, analysis and interpretation of information (instrumental competence);
- development of ideas and critical argumentation (interpersonal competence);
- self-motivation and self-management (systemic competence)

2. be capable of effective use in various situations:

- their skills (instrumental competence);
- their emotional understanding (interpersonal competence);
- the ability to think and work flexibly, adapting to new changing circumstances (instrumental and interpersonal competence).

3. be able to:

- formulate the objectives of the project (program) for solving problems, identify priorities for solving problems (instrumental, subject-specific competencies);
-to use information technologies in the design and construction of energy, heat engineering, heat technology equipment, networks and systems (instrumental, subject-specific competencies);
- to find a compromise between different requirements (for cost, quality, safety and deadlines), both in long-term and short-term planning (interpersonal competencies);

4. have an idea:

- about spiritual values and their meaning (systemic competence);
- about the consequences of your professional activity (instrumental competence);
- on the organizational basis of measures to eliminate the consequences of accidents, catastrophes, natural disasters and other emergency situations (system competence);

5. to know and understand:

- fundamentals of the legislation of the Republic of Kazakhstan in the field of energy saving, legal moral and ethical standards in the field of professional activity (instrumental competence);
- modern and promising directions for the development of thermal power and thermal technology systems (system and subject-specific competencies);
- principles of operation, technical characteristics and design features of thermal power and thermal technology installations and systems being developed and used (instrumental and subject-specific competencies);
- methods of conducting theoretical and experimental research in the field of thermal power engineering;
- fundamentals of design, construction, installation and operation of thermal power engineering devices and systems (subject-specific competence);
- requirements for standardization, metrological support and life safety in the development and operation of thermal power engineering devices and systems (system and subject-specific competencies);
- methods and tools for modeling and optimization of thermal power plants and systems (subject-specific competence);
- basic methods of marketing and management in the field of thermal power engineering (subject-specific competence);
- rules and regulations for the design, construction, installation and operation of thermal power systems and installations (subject-specific competence);

6. own:

- thermodynamic methods for calculating the cycles of thermal machines and the efficiency of cycles (instrumental and subject-specific competencies);

- methods for calculating the flow of liquids and gases and heat transfer (subject-specific competence);

- methods of calculating heat consumption by various consumers of an industrial area (subject-specific competence);

- methods for calculating the hydraulic resistances of thermal networks (subject-specific competence);

- methods of designing, calculating and regulating energy production and distribution systems (subject-specific competence);

- methods of organizing installation, commissioning and repair work of thermal technology equipment and fuel and water supply systems (subject-specific competence).

4 The base of passing professional practices

Students are directed to production, pre-production practice according to their business, which includes basic practice (either individual or collective) in accordance with the order of the rector of the practice. So stories KATU im. S. Seifullina is the head of practice for every student.

This profile of students will practice at enterprises of top-level and energy groups: - thermal power centers (CHPP), condensing electric stations (CPP), atomic electric stations (NPP), low density, thermal networks; - oil and gas processing enterprises; for their production and enterprises, where there is thermal insulation.

They will be represented in: JSC "Astana Energy", JSC" Astana Teplotranzit", GKP on PCV" Kyzylordateploelectrocenter", GKP on PCV" Uzen zhylys", G. Ozen, G. Semey" GKP Teplokommuenergo", G. Aktau, GKP" Caspian Teylys, Su Arnasy", G. Aktobe, JSC Transenergo and T.D.

5 The structure of the educational program

№	Name of cycles and disciplines	Total labor intensity	
		in academic hours	in academic credits
1	2	3	4
1	**General education subjects (GER)**	**1680**	**56**
1.1	**Core subjects (CS)**	**1530**	**51**
	History of Kazakhstan	150	5
	Philosophy	150	5
	Foreign language	300	10
	Kazakh (russian) language	300	10
	Information and communication technologies	150	5
	Cultural studies and psychology	120	4
	Political science and sociology	120	4
	Physical education.	240	8
1.2	**University component(UC)**	**150**	**5**
	Basics of economics and law	150	5
2	**Base requirements(BS)**	**3480**	**116**
2.1	**University component(UC)**	**2070**	**69**
	Mechanics of liquid and gas	150	5
	Mathematics 1,2	270	9
	Physics	120	4
	Theoretical basis of heat engineering	180	6
	Professional Kazakh (Russian) language	90	3
	Professionally-oriented Foreign Language	90	3
	Mechanics	120	4
	Electrical engineering and electronics	120	4
	Measuring of Heat engineering	150	5
	Materials science in heat engineering	120	4
	Basics of the scientific researches	150	5
	Engineering and computer graphics	120	4
	Educational practice	30	1
	Internship	240	8
	Pre diploma practice	300	10
2.2	**Electives(ES)**	**1410**	**47**
	Basics of financial literacy	90	3
	Basics of anti-corruption culture		
	Warm mass-transfer	150	5
	A heat transfer is in heating engineering processes and installations		
	Technological bases of preparation of the water and fuel at thermal power plants and industrial enterprises	150	5
	Physical and chemical methods of preparation of water		
	Computer technologies are in calculations	150	5
	Digital competencies in professional activities (Minor)		
	Professionally-oriented Foreign Language	90	3

	Fundamentals of Artificial Intelligence		
	Fuel and combustion theory	180	6
	Special Issues of Fuel Combustion		
	Alternative renewable energy sources	150	5
	Nuclear power plants		
	Energy saving and energy efficiency in heat power engineering and heat technology	150	5
	Energy efficiency and energy audit of energy enterprises		
	Chemical control in thermal power plants	150	5
	Corrosion and conservation of energy equipment		
	Repair and adjustment of TPP equipment	150	5
	Installation of turbines and auxiliary equipment		
3	**Profession requirements(AS)**	**1800**	**60**
3.1	**University component(UC)**	**660**	**22**
	Boiler plants and steam generators	180	6
	Superchargers and heat engines	150	5
	Heat networks and heat supply systems	180	6
	Safety in power plants	150	5
3.2	**Electives(ES)**	**1140**	**38**
	Autonomous heat supply	150	5
	High temperature processes and installations		
	Pumps, fans and compressors in systems of heat gas supply and ventilation	180	6
	Steam and gas turbines		
	Engineering systems of buildings and structures	150	5
	Operation of heating equipment		
	Theoretical foundations of thermal power plants	180	6
	Thermal power systems and energy use		
	Implementation of technological processes and environmental technologies at thermal power plants	180	6
	Environmental technologies in fuel combustion		
	Calculation of efficiency in thermal power engineering	150	5
	Multimedia technologies (Minor)		
	Repair and operation of power equipment	150	5
	Operation modes of thermal power plants		
4	**Additional courses**		
4.1	Elective component (military training and other types of educational activities determined by the student himself)		
5	**Module of final certification (MoFC)**	**240**	**8**
5.1	Writing and defending a thesis (project) or preparing and passing a comprehensive exam	240	8
	Total	**7200**	**240**

6. Working curriculum (for the entire period of study)

The Ministry of Agriculture of the Republic of Kazakhstan
NC JSC "S.Seifullin Kazakh Agrotechnical Research University"

Considered at the meeting
of Academic Council
of the University
Protocol № 9
«28» 05 2024 y.

APPROVED
Member of the Board
Vice-Rector for Academic Affairs
NC JSC "KATIU"
Abisheva R.D.
«__» _____ 20___ y.

CURRICULUM
for 2024-2028 academic year
For the modular education program "Thermal Power Engineering"
by the speciality/group of educational programmes B062 – Electrical and power engineering
Degree: Bachelor
Form of education: Full-time (bachelor 4 years) semester
Entry year: 01-09-2024

Module code	Module name	Discipline cycle	Discipline component	Code of subject	Subject name	Academic credits	Academic study period	Control in the academic period			Number of hours								Distribution of credits per academic period							
												Classroom work						Independent work of		1 course		2 course		3 course		4 course	
																				1	2	3	4	5	6	7	8
																				Number of weeks in the academic period							
								Exams	Differentiated test	Term paper/project	Total	Lectures	Laboratory trainings	Practice	Studio lessons	Practice	Independent work of students with the participation of a teacher	Independent work of students			15	15	15	15	15	15	15	15
General modules																											
1	Language	GER	CS	IYa 1103	Foreign language	5	1	1			5/150			45			20	85	5.0							
2		GER	CS	KRYa 1104	Kazakh (russian) language	5	1	1			5/150			45			20	85	5.0							
3		GER	CS	IYa 1107	Foreign language	5	2	2			5/150			45			20	85		5.0						
4		GER	CS	KRYa 1105	Kazakh (russian) language	5	2	2			5/150			45			20	85		5.0						
5	Public and political	GER	CS	PS 1112	Political science and sociology	4	1	1			4/120	15		30			16	59	4.0							
6		GER	CS	KP 1111	Cultural studies and psychology	4	2	2			4/120	15		30			16	59		4.0						
7		GER	CS	IK 1114	History of Kazakhstan	5	2	2			5/150	15		30			20	85		5.0						
8		GER	CS	Fil 2110	Philosophy	5	4	4			5/150	15		30			20	85				5.0				
9		GER	UC	OEP 2113	Basics of economics and law	5	4	4			5/150	15		30			20	85				5.0				
10		BS	ES	OFG 2226	Basics of financial literacy	3	4	4			3/90	15		15			12	48				3.0				
11		BS		OAK 2226	Basics of anti-corruption culture			4			3/90	15		15			12	48								
12	General education	GER	CS	IKT 1102	Information and communication technologies	5	1	1			5/150	15	30.0				20	85	5.0							
13		BS	UC	Fiz 1207	Physics	4	1	1			4/120	15	15.0	15			16	59	4.0							
14		BS	UC	M 1206	Mathematics 1	5	1	1			5/150	15		30			20	85	5.0							
15		BS	UC	M 1209	Mathematics 2	4	2	2			4/120	15		30			16	59		4.0						
16		BS	UC	IKG 1208	Engineering and computer graphics	4	2	2			4/120	15	30.0				16	59		4.0						
17		BS	UC	Meh 2218	Mechanics	4	3	3			4/120	15		30			16	59			4.0					
18	Physical education	GER	CS	FK 1101	Physical education	2	1		1		2/60			30			8	22	2.0							
19		GER	CS	FK 1106	Physical education	2	2		2		2/60			30			8	22		2.0						
20		GER	CS	FK 2108	Physical education	2	3		3		2/60			30			8	22			2.0					
21		GER	CS	FK 2109	Physical education	2	4		4		2/60			30			8	22				2.0				
Modules of specialty/education programms																											
22	Production	**BS**	**UC**	**UP 1219**	**Educational practice**	**1**	**2**				**1/30**					30				1.0						
23		**BS**	**UC**	**PP 3220**	**Internship**	**3**	**5**				**3/90**					90							3.0			
24		**BS**	**UC**	**PP 4221**	**Internship**	**5**	**7**				**5/150**					150									5.0	
25		**BS**	**UC**	**PP 4222**	**Pre diploma practice**	**10**	**8**				**10/30**					300										10.0
26	Theoretical disciplines	BS	UC	TI 2212	Measuring of Heat engineering	5	3	3			5/150	15	15.0	15			20	85			5.0					
27		BS	UC	EE 2211	Electrical engineering and electronics	4	3	3			4/120	15	30.0				16	59			4.0					
28		BS	UC	TOT 2210	Theoretical basics of heat engineering	6	3	3			6/180	30		30			24	96			6.0					
29		BS	UC	MT 2214	Materials science in heat engineering	4	3	3			4/120	15		30			16	59			4.0					
30		BS	ES	Tep 2225	Warm mass-transfer	5	3	3			5/150	15	15.0	15			20	85			5.0					
31		BS		TTPU 2225	A heat transfer is in heating engineering processes and installations			3			5/150	15	15.0	15			20	85								
32		BS	UC	MZhG 2213	Mechanics of liquid and gas	5	4	4			5/150	15	15.0	15			20	85				5.0				
33		BS	ES	TOPVTTPP 2201	Technological bases of preparation of the water and fuel at thermal power plants and industrial enterprises	5	4	4			5/150	15		30			20	85				5.0				
34		BS		FHMPV 2201	Physical and chemical methods of preparation of water			4			5/150	15		30			20	85								
35		BS	ES	KTTR 2227	Computer technologies are in calculations	5	4	4			5/150	15	30.0				20	85				5.0				
36		BS		CKPDM 2227	Digital competencies in professional activities (Minor)			4			5/150	15	30.0				20	85								

37		BS	UC	ONJ 3217	Basics of the scientific researches	5	5	5			5/150	15		30			20	85					5.0							
38		BS	ES	POIYa 3228	Professionally-oriented Foreign Language	3	6	6			3/90	15		15			12	48						3.0						
39		BS		OII 3228	Fundamentals of Artificial Intelligence			6			3/90	15		15			12	48												
40		BS	ES	TTG 3205	Fuel and combustion theory	6	5	5			6/180	30		30			24	96					6.0							
41		BS		SVST 3205	Special Issues of Fuel Combustion			5			6/180	30		30			24	96												
42		BS	ES	AVIE 3203	Alternative renewable energy sources	5	6	6			5/150	15		30			20	85						5.0						
43		BS		YaEU 3203	Nuclear power plants			6			5/150	15		30			20	85												
44		BS	ES	EETT 3202	Energy saving and energy efficiency in heat power engineering and heat technology	5	6	6			5/150	15		30			20	85						5.0						
45		BS		EEE 3202	Energy efficiency and energy audit of energy enterprises			6			5/150	15		30			20	85												
46		BS	ES	HKTES 4204	Chemical control in thermal power plants	5	7	7			5/150	15		30			20	85							5.0					
47		BS		KKEO 4204	Corrosion and conservation of energy equipment			7			5/150	15		30			20	85												
48	Basic disciplines	AS	UC	KUP 3306	Boiler plants and steam generators	6	5	5			6/180	30		30			24	96					6.0							
49		AS	UC	NTD 3307	Superchargers and heat engines	5	5	5			5/150	15		30			20	85					5.0							
50		AS	ES	AT 3310	Autonomous heat supply	5	5	5			5/150	15		30			20	85					5.0							
51		AS		VPU 3310	High temperature processes and installations			5			5/150	15		30			20	85												
52		AS	UC	TSST 3308	Heat networks and heat supply systems	6	6	6			6/180	30		30			24	96						6.0						
53		AS	ES	NVKSTV 3301	Pumps, fans and compressors in systems of heat gas supply and ventilation	6	6	6			6/180	30		30			24	96						6.0						
54		AS		PGT 3301	Steam and gas turbines			6			6/180	30		30			24	96												
55		AS	ES	ISZS 3311	Engineering systems of buildings and structures	5	6	6			5/150	15		30			20	85						5.0						
56		AS		ETO 3311	Operation of heating equipment			6			5/150	15		30			20	85												
57		AS	UC	TBEU 4309	Safety in power plants	5	8	8			5/150	15		30			20	85												5.0
58		BS	ES	RNOT 4223	Repair and adjustment of TPP equipment	5	7	7			5/150	15		30			20	85							5.0					
59		BS		MTVO 4223	Installation of turbines and auxiliary equipment			7			5/150	15		30			20	85												
60		AS	ES	TOTES 4303	Theoretical foundations of thermal power plants	6	7	7			6/180	30		30			24	96							6.0					
61		AS		TSE 4303	Thermal power systems and energy use			7			6/180	30		30			24	96												
62	Professional	AS	ES	RTPPTT 4302	Implementation of technological processes and environmental technologies at thermal power plants	6	7	7			6/180	30		30			24	96							6.0					
63		AS		PTPST 4302	Environmental technologies in fuel combustion			7			6/180	30		30			24	96												
64		AS	ES	RET 4316	Calculation of efficiency in thermal power engineering	5	7	7			5/150	15		30			20	85							5.0					
65		AS		MTM 4317	Multimedia technologies (Minor)			7			5/150	15		30			20	85												
66		AS	ES	RETO 4305	Repair and operation of power equipment	5	8	8			5/150	15		30			20	85												5.0
67		AS		RRTES 4305	Operation modes of thermal power plants			8			5/150	15		30			20	85												
					Additional modules beyond qualification																									
					Modules of choice																									
					Scientifically research																									
																			60	60	60	60	60	60	64	40		
					Weekly average workload at hours																									
1					**General education subjects(GER)**	56		10	4	0	1680	90	30	450	0	0	224	886	21	21	2	12	0	0	0	0					
					Core subjects(GER/CS)	51		9	4	0	1530	75	30	420	0	0	204	801	21	21	2	7	0	0	0	0					
					University component(GER/UC)	5		1	0	0	150	15	0	30	0	0	20	85	0	0	0	5	0	0	0	0					
					Electives(GER/ES)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
2					**Base requirements(BS)**	116		21	0	0	2070	180	105	225	0	570	200	790	9	9	28	18	14	13	15	10					
					Core subjects(BS/CS)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
					University component(BS/UC)	69		11	0	0	2070	180	105	225	0	570	200	790	9	9	23	5	8	0	5	10					
					Electives(BS/ES)	47		10	0	0	0	0	0	0	0	0	0	0	0	0	5	13	6	13	10	0					
3					**Profession requirements(VRS)**	60		11	0	0	660	90	0	120	0	0	88	362	0	0	0	0	16	17	17	10					
					Core subjects(VRS/CS)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
					University component(VRS/UC)	22		4	0	0	660	90	0	120	0	0	88	362	0	0	0	0	11	6	0	5					
					Electives(VRS/ES)	38		7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	11	17	5					
					Total on curriculum	232			4	0	4410	360	135	795	0	570	512	2038	30	30	30	30	30	30	32	20					
4					**Additional courses**										**Number of credits**				**Academic period**			**Number of hours**			**Number of weeks**					
5					**Module of final certification (MoFC)**										**8**							**240.0**								
					Total including FC										**240**							**7200.0**								

Director of Department of Academic Affairs — Жургенов Жакенбай Сарсенбаевич

Deputy Director of the Department of Academic Affairs — Нургалиева Алмагуль Шаймуратовна

Dean of the faculty Energy — Исенов Султанбек Сансызбаевич

Head of the Department — Мергалимова Алмагуль Каирбергеновна

7. Appendix 1. Academic calendar

Approve
Chairman of the Academic Council
NJSC "S.Seifullin KATIU"
_____ Tireuov K.M.
«28» 03 2024

ACADEMIC CALENDAR
for 2024-2025 academic year
by levels of training
BACHELOR

Presentation week, registration for disciplines	1 course from 26 to 29 August, 2024
I semester	**September 2 - December 13**
Constitution day	***August 30***
Knowledge Day	***September 1***
Republic Day	***October 25***
Independence Day	***December 16***
Boundary control 1	from October 14 to October 18, 2024
Boundary control 2	from December 9 to December 13, 2024
Exam session	from December 17 to December 27, 2024
Passing FX	from December 17, 2024 to January 3, 2025
New Year's Holiday	***January 1, 2***
Holidays	from January 6 to January 24, 2025
II semester	**from January 27 to May 8, 2025**
International Women's Day	***March 8***
Holiday Nauryz	***March 21, 22, 23***
Registration for disciplines	2,3,4,5 course from April 7 to April 11, 2025
Holiday of unity of the people of Kazakhstan	***May 1***
Defender of the Fatherland Day	***May 7***
Victory Day	***May 9***
Boundary control 1	from March 10 to March 14, 2025
Boundary control 2	from May 5 to May 8, 2025
Exam session	from May 12 to May 23, 2025
Passing FX	from May 12 to May 30, 2025
Registration for the summer semester	from June 2 to June 6, 2025
Final examination	until June 30, 2025
Summer semester	from June 9 to July 18, 2025
Holidays*(except for graduation courses)*	from May 26 to August 29, 2025
Capital Day	***July 6***
Practice	types and terms of professional practice are determined by the working Curriculum of Educational Program

Approved by the Academic Council of NJSC «S. Seifullin KATIU»,
protocol № 12 of 28.03.2024

Appendix 1 to the Academic Calendar

Approved by the Academic Council of the NJSC "S.Seifullin KATIUS", Protocol №12, of 28.03.2024 y.

Schedule of the educational process for the 2024-2025 academic year for the educational program Energy faculty

BACHELOR

Courses	September					October					November					December					January					February				Mart				April					May					June				July					August			
	26	2	9	16	23	30	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27	3	10	17	24	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18	25
	30	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	14	21	28	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
B07102 - "Electric power industry"																																																						
I	PW	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	JEP	EP/BC	E/P	E/P	P/H	TD/H	H/S	H/S	H/S	H/S	H/S	S/H	H	H	H	H	H	H
II	H	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	H/TD/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	S/H	H	H	H	IP	IP	IP
III	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	H/TD/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	S/H	H	H	IP	IP	IP	IP
IV	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	IP	IP	IP	IP	IP	IP	IP/U	.	.	.	.	.	.	JBC2	E/P	FE	FE	FE	FE	FE	FE	FE								
B07103 - "Electrical engineering"																																																				
I	PW	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	JEP	EP/BC	E/P	E/P	E/TD/H	H/S	H/S	H/S	H/S	H/S	H/S	S/H	H	H	H	H	H	H
II	H	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	H/TD/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	S/H	H	H	H	IP	IP	IP
III	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	H/TD/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	S/H	H	H	IP	IP	IP	IP
IV	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	IP	IP	IP	IP	IP	IP	IP/U	IP/U	.	.	.	.	.	JBC2	E/P	FE	FE	FE	FE	FE	FE	FE								
6B07101- "Thermal Engineering", 6B07107-"Heat and gas supply, ventilation and eco-engineering in agriculture"																																																			
I	PW	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	/EP	/EP	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	TD/H	H/S	H/S	H/S	H/S	H/S	S/H	H	H	H	H	H	H
II	H	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	H/TD/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	S/H	H	H	IP	IP	IP	IP
III	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	H/TD/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	S/H	H	H	IP	IP	IP	IP
IV	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	U	U	U	U	U	U	U	U	U	U	.	.	.	JBC2	E/P	FE	FE	FE	FE	FE	FE	FE								
6B06201 - "Telecommunication Networks and Systems"																																																			
I	PW	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	TD/H	H/S	H/S	H/S	H/S	H/S	S/H	H	H	H	H	H	H
II	H	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	H/TD/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	S/H	H	H	IP	IP	IP	IP
III	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	H/TD/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	S/H	H	H	H	H	IP	IP
IV	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	IP	IP	IP	IP	IP/U	IP/U	IP/U	IP/U	IP/U	IP/U	.	.	.	JBC2	E/P	FE	FE	FE	FE	FE	FE	FE								
6B06202 - "Radio engineering and electronics"																																																			
I	PW	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	TD/H	H/S	H/S	H/S	H/S	H/S	S/H	H	H	H	H	H	H
II	H	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	H/TD/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	S/H	H	H	IP	IP	IP	IP
III	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	H/TD/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	S/H	H	H	IP	IP	IP	IP
IV	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	IP	IP	IP	IP	IP/U	IP/U	IP/U	IP/U	IP/U	IP/U	.	.	.	JBC2	E/P	FE	FE	FE	FE	FE	FE	FE								
6B07108 - "Automation and energy efficiency of processes and production", 6B08702 - "Energy supply and automation of agriculture"																																																		
I	PW	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	JEP	JEP	JEP	EP/BC	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	TD/H	H/S	H/S	H/S	H/S	H/S	S/H	H	H	H	H	H	H
II	H	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	H/TD/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	S/H	H	H	IP	IP	IP	IP
III	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	H/TD/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	H/S/MT	S/H	H	IP	IP	IP	IP	IP
IV	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	IP	IP	IP	IP	IP	IP	IP	IP	IP	IP	.	.	.	JBC2	E/P	FE	FE	FE	FE	FE	FE	FE								
6B07108 - "Automation and energy efficiency of processes and production", (SOPR), 3 years																																																		
I	PW	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	JEP	JEP	JEP	EP/BC	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	TD/H	H/S	H/S	H/S	H/S	H/S	S/H	H	H	H	IP	IP	IP
B07102 - "Electric power industry", (SOPR), 3 years																																																	
I	PW	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	H	H	H	H	.	.	.	.	.	.	.	.	.	.	RD	.	.	JEP	EP/BC	E/P	E/P	P/H	TD/H	H/S	H/S	H/S	H/S	H/S	S/H	H	H	H	IP	IP	IP
II	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	H	H	H	H	.	.	.	.	.	.	.	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	TD/H	H/S	H/S	H/S	H/S	H/S	S/H	H	H	H	IP	IP	IP
6B06201 - "Telecommunication Networks and Systems", (SOPR), 3 years																																																		
II	IP	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	TD/H	H/S	H/S	H/S	H/S	H/S	S/H	H	H	H	IP	IP	IP
6B07110- "Thermal Engineering", (SOPR), 3 years																																																		
I	PW	.	.	.	.	.	.	JBC1	.	.	.	.	.	.	.	JBC2	E/P	E/P	P	H	H	H	.	.	.	.	.	JBC1	.	.	.	RD	.	.	.	JBC2	E/P	E/P	P/H	TD/H	H/S	H/S	H/S	H/S	H/S	S/H	H	H	H	IP	IP	IP

Conventions

Presentation week	Theoretical training	Enrollment in disciplines	Examination session	Passing FX	Holidays	Military trainin	Summer semester	Final examination	Educational practice	Industrial practice	Undergraduatepractice	Boundary control
PW	•	TD	E	P	H	MT	S	FE	EP	IP	U	BC

Public holidays

September 1	Knowledge day	March 8	International Women's Day
December 16	Independence Day of the RK	March 21-23	Holiday " Nauryz"
January 1-2	New year	May 1	Day of Unity of the Nations of Kazakhstan
August 30	New yaer	May 7	Defender of the Fatherland day
October 25	Republic Day	May 9	Victory Day
		July 6	Capital Day

registration for disciplines: RD

8. Description of the disciplines of compulsory and university components

№	Name of discipline	Short description of discipline)	Number of credits	Emerging competencies (codes)								
				ON 1	ON 2	ON 3	ON 4	ON 5	ON 6	ON 7	ON 8	ON 9
The GED/OK cycle												
1	Foreign language	Improving the initial level of foreign language proficiency achieved at the previous stage of education, and mastering by students the necessary and sufficient level of communicative professionally oriented competence to solve social and communicative tasks in various fields of everyday, cultural, professional and scientific activities when communicating with foreign partners, as well as for further self-education.	10							+		
2	Political science and sociology	Formation of the ability to critically understand the system of interpersonal relations in society, awareness of the nature of society, the system of its groups, institutions. Forms knowledge about the laws and patterns of world politics and modern political processes, explaining the essence and content of the policy of national states, based on ensuring national security and the realization of national interests.	4							+		
3	Philosophy	Formation of students' ideas about philosophy as a specific field of knowledge, about philosophical, scientific and religious pictures of the world, about the meaning of human life, forms of human consciousness and features of its manifestation in modern society, about the relationship of spiritual and material values, their role in human life, society and civilization.	5							+		
4	History of Kazakhstan	Knowledge of the prerequisites for the formation of the statehood of modern Kazakhstan at the source of world and Eurasian historical processes. The ability to critically analyze historical events based on retrospective, comparative historical and other scientific	5							+		

		methods. Achieving a deep and holistic perception of the history of the Fatherland, the ability to distinguish the true story based on facts and evidence.										
5	Cultural studies and psychology	The development of a socio-humanitarian worldview as the basis for the modernization of public consciousness through the formation of cultural identity, the ability to analyze and evaluate cultural situations based on an understanding of the nature of cultural processes, the specifics of cultural objects, the role of cultural values in intercultural communication, knowledge of the basics of general psychology, personality psychology, individual typological characteristics of personality: temperament, character, abilities.	4							+	+	
6	Information and communication technologies	Mastering theoretical knowledge in the field of modern information technologies, software for professional activities, studying the goals, objectives, problems and prospects of information technology development and acquiring skills in their application, determining the basic principles of organization and functioning of technical and software tools of automated systems used in professional activities, as well as the formation of necessary competencies.	5									+
7	Professional Kazakh (Russian) language	Formation of knowledge and skills for successful mastery of types of speech activity, understanding of the peculiarities of the functioning of the Kazakh (Russian) language system, improvement of language skills in various situations of everyday, socio-cultural, professional communication, improvement and activation of oral and written speech, taking into account all types.	10							+		
8	Physical education	Ensuring that students have a sufficient level of physical readiness of future specialists, a high level of efficiency; the development of professionally significant physical and psychomotor abilities.The development of skills that ensure the preservation and strengthening of health, the	8							+		

		development and improvement of psychophysical abilities and qualities.										
The GED/UC cycle												
9	Basics of economics and law	The discipline promotes knowledge of the subject of economic theory and methods of research, the basis of public production and forms of public economy, the mechanism of functioning of the market system, production, costs and income of the firm, national economy. To master the basics of the theory of the state and law, the basics of constitutional, administrative, civil, labor, family, criminal law.	5						+			
The BD/UC cycle												
10	Basics of the scientific researches	The discipline is aimed at the formation of students' knowledge about modern science, understanding, awareness and ability to properly organize research work, planning and conducting experiments, statistical processing and evaluation of the results of experiments, as well as mastering the ways and methods of preparing and forming the presentation of scientific information in professional activity.	5								+	
11	Materials science in heat engineering	Formation of knowledge about the properties and methods of processing modern materials used in energy and thermal physics, the fundamentals of materials science and the technology of structural materials, the structure and basic properties of energy structural materials used in the repair, operation and maintenance of equipment, the essence of the phenomena occurring in materials under the operating conditions of products, methods for obtaining materials with desired properties.	4					+				

12	Measuring of Heat engineering	The study of devices, principles of operation and methods of using means for measuring and controlling heat engineering and other quantities associated with the production and consumption of thermal energy. Mastering the skills of independent substantiation and selection of measuring instruments for solving the measurement problem, organizing and conducting measurement and control, processing measurement results, assessing their accuracy and reliability.	5					+			+	
13	Theoretical basics of heat engineering	Formation of students' knowledge of the fundamental laws of thermodynamics, with the main forms of heat propagation in space, processes and equipment used in the design and operation of complex heat engineering systems, their repair and modernization, the main laws of the processes of interconversion of heat and work, the properties of ideal and real working fluids and coolants , cycles of thermal power plants and refrigeration machines.	6					+			+	
14	Engineering and computer graphics	Formation of knowledge of design documentation in accordance with standards, rules for constructing drawings of detachable and one-piece connections of parts and assembly units, developing the skills necessary to complete and read technical drawings, perform sketches of parts, draw up design and technical documentation for production. Proficiency in working with computer drawing programs at a high level.	4					+				+
15	Mathematics 1	The purpose of studying the discipline is to form students' scientific and practical understanding of mathematical methods for describing and solving practical problems in engineering, technology, economics. The objectives of the discipline are the assimilation of the basic concepts, methods and tasks of the sections: linear algebra; analytical geometry; elements of vector algebra; mathematical analysis, the study of functions.	5		+							
16	Mathematics 2	The discipline aims to provide students with serious mathematical training, which, in addition to the fact that	4		+							

		it is based on the fundamental nature of knowledge, guarantees the development of a certain culture of thinking and the development of creative approach to solving tasks. The course assumes consideration of the simplest applications of higher mathematics in engineering, industry.										
17	Mechanics	The purpose of teaching the discipline is to form students' ideas about the concepts, laws and methods of classical mechanics, the basic laws of classical mechanics, kinematic and dynamic methods of describing mechanical systems, the laws of dynamics of a system of material points and a solid body, the laws of conservation of mechanical quantities, the basic concepts of continuum mechanics.	4					+				
18	Mechanics of liquid and gas	Formation of a complex of fundamental knowledge in the field of fluid and gas mechanics related to the movement of the working medium. The study of the general laws of motion and equilibrium of liquid and gaseous media, the main models of liquid and gaseous media. Formation of the ability to solve practical problems of fluid and gas mechanics by basic mathematical methods.	5					+				
19	Physics	The discipline studies the basic physical phenomena, fundamental laws and concepts, as well as methods of physical research. Considers techniques and methods for solving typical problems from various fields of physics, introduces modern scientific equipment, forms the skills of conducting an experiment, the ability to highlight specific physical content in applied problems of a future specialty	4		+			+				
20	Electrical engineering and electronics	To study linear electric circuits of direct current, linear electrical circuits of single-phase sinusoidal current, three-phase circuits, concepts of nonlinear circuits and transients, magnetic circuits and transformers.	4		+							
The BD/EC cycle												
21	Alternative renewable energy sources	Formation of students' knowledge of the main types of non-traditional renewable energy sources, their role in	5	+		+		+				

		the overall energy production, prospects and features of their use in solving problems of heat supply and energy saving, methods and criteria for evaluating the effectiveness of technologies based on renewable energy sources, taking into account economic and environmental requirements in modern conditions.										
22	Artificial intelligence basics	Introduction to Artificial Intelligence (AI). Application of AI in various fields. The basics of AI. Search algorithms and problem solving methods. Knowledge representation. Machine learning. Neural networks and deep learning. Natural language processing. Computer vision and image processing. Robotics and intelligent agents. Ethical and social implications and I. Cognitive architectures and models of human thinking.	3									+
23	Basics of anti-corruption culture	The course forms a system of knowledge on combating corruption, and the development on this basis of a civil position in relation to this phenomenon. As a result of mastering the discipline, students will be able to: navigate the legislation; analyze and apply legal acts in specific situations, follow moral.	3						+			
24	Technological bases of preparation of the water and fuel at thermal power plants and industrial enterprises	Study of quality requirements, and methods of preparation of the make-up water of the station and heating networks. Knowledge of the skills of preparation, transportation of water, modes of operation of equipment and systems for water preparation and purification, determination of the dependence of technical and economic indicators on regime parameters, methods of chemical control over the state of water; methods of preparation of solid, liquid and gaseous fuels.	5	+			+					
25	Chemical control in thermal power plants	The purpose of teaching the discipline is to acquire knowledge by students in the field of organization and conduct of chemical control over the quality of the coolant in the conditions of its preparation and operation of equipment at thermal power plants, methods of preparation, transportation of water resources, operating modes of equipment and water treatment systems,	5	+		+	+					

		dependence of technical and economic indicators on regime parameters, methods of chemical control over the state of water.										
26	Computer technologies are in calculations	Formation of students' knowledge, skills and abilities of using computer programs and technologies for calculating heat power facilities. Mastering the skills of using drawing software, modeling heat and power processes and heat power equipment, applying numerical methods to solve heat engineering problems, using application programs for data processing and performing heat engineering calculations.	5					+				+
27	Warm mass-transfer	Theoretical foundations of engineering methods for calculating thermal processes are studied; more complex problems of convective heat transfer are also considered, including the problems of thermal convection, melting - crystallization, evaporation - condensation, methods for solving heat transfer problems. Students receive analytical solutions to the simplest problems, get acquainted with the methods of constructing self-similar solutions, as well as numerical methods for solving nonlinear problems of convective heat transfer.	5					+				
28	A heat transfer is in heating engineering processes and installations	Formation of students' knowledge in the field of fundamental laws and methods of analysis and calculation of heat transfer processes in heat exchangers, efficient operation of heat engineering equipment using modern methods of using heat, characteristics of the thermal state of elements of thermal machines and devices. Mastering practical skills to determine the characteristics of heat and mass transfer processes in heat engineering installations.	5					+				
29	Energy saving and energy efficiency in heat power engineering and heat technology	Formation of students' knowledge and skills in the field of legal, organizational, scientific, industrial, technical and economic measures aimed at the efficient use of energy resources. Skills for evaluating the efficiency of using energy carriers in energy complexes, compiling energy balances, analyzing an organization's energy	5	+		+						

		passport, developing and implementing energy-saving technologies.										
30	Repair and adjustment of TPP equipment	Formation of knowledge in the field of technology of repair and adjustment of the main and auxiliary equipment at the construction sites of thermal power plants and operating energy enterprises. Familiarization of students with the basic technological processes of repair of boilers and steam turbines, auxiliary equipment, the sequence and methods of their installation, methods of repair, planning the organization of repairs of the main and auxiliary equipment of power plants.	5	+			+					
31	Professionally-oriented Foreign Language	Forms the professional foreign language speech of future specialists to increase the level of professional competence, proficiency in a professional foreign language for the implementation of written and oral information exchange, further development of speech activity. Rules of speech behavior in accordance with situations of professional communication, depending on the style and nature of communication in the social, household and academic spheres.	3							+		
32	Digital competencies in professional activities (Minor)	The study of the discipline considers modern trends in the development of new digital technologies, the main ways of their application in science and education, as well as the application of basic methods, ways and means of obtaining, storing and processing information in solving professional problems.	5									+
33	Basics of financial literacy	The concept, goals and objectives of financial literacy. Money, settlements and payments. Personal finances: income, expenses, budget. Taxes and taxation of individuals. Banking services for the population. Insurance. Financial markets and basics of investing. Individual entrepreneurship and startup. Personal financial security.	3						+			
34	Special Issues of Fuel Combustion	Formation of knowledge on: methods of fuel combustion and organization of combustion processes in boiler plants of stations and small boiler houses;	6	+		+						

		modern technologies for fossil fuel combustion with the highest economic and environmental efficiency: the mechanism of the formation of harmful substances in the combustion process, the dependence of the temperature regime on the formation of nitrogen oxides; organization of liquid and solid ash removal in boiler furnaces.										
35	Fuel and combustion theory	Formation of students' knowledge on: fuel preparation and fuel supply, the theory of combustion of organic fuels and skills for their practical application in the organization of combustion processes. Possession of information about the fuel and energy balance of the Republic of Kazakhstan, the role of various types of energy fuel in the national economy, the skills to perform basic technological calculations of combustion processes.	6	+		+						
36	Physical and chemical methods of preparation of water	Formation of students' knowledge, skills and abilities in the application of modern physical-chemical, ion-exchange, thermal, membrane methods of water purification both for low-pressure, high-pressure heat and power equipment of boiler houses and thermal power plants, and for heating networks, wastewater. Mastering the characteristics of natural waters, schemes of water circulation in the tract, the technological process of water treatment.	5				+		+			
37	Installation of turbines and auxiliary equipment	The purpose of the discipline is the formation of knowledge on: the purpose, arrangement of basic materials, tools and technical means used in the installation and operation of equipment and installations; modern methods of organizing and performing works on installation, commissioning and maintenance of turbine installations necessary in practice; methods, types, scope, nature of the installation and maintenance work carried out. equipment operation.	5	+			+					
38	Corrosion and conservation of energy equipment	Acquaintance with technologies for protecting metal from corrosion, to ensure reliable and efficient	5	+		+	+					

		operation of heat and power equipment. Formation of knowledge about: corrosion processes, technology and circuit solutions for protecting equipment from corrosion; influence of impurities in water on metal corrosion; influence of temperature and thermal loads on corrosion; inhibitors and stimulants of corrosion; technological modes of equipment conservation.										
39	Energy efficiency and energy audit of energy enterprises	Formation of knowledge on: the legislative framework in the field of energy saving and energy audit, regulations on energy saving and energy audits, analysis of opportunities for energy saving and improving the efficiency of energy enterprises. Formation of skills: conducting an energy audit, compiling an energy passport of an object, calculating the heat loss of buildings and structures, calculating the economic costs of energy-saving measures.	5	+		+						
40	Nuclear power plants	The study of the basic principles of obtaining and using nuclear energy, technological and thermal schemes of nuclear power plants, structures and features of the operation of nuclear power plants, the basics of the design of a nuclear reactor, the basics of control and management of nuclear power plants. Formation of skills in: spent fuel reprocessing and waste disposal, exclusion of environmental pollution by radioactive elements, nuclear fission products.	5	+	+	+		+				
The PD/UC cycle												
41	Heat networks and heat supply systems	Familiarization of students with the arrangement of heat supply systems and heat networks in populated areas, the regulatory framework in the field of design and construction of heat supply systems, prospects for the development of heat supply systems. Formation in students of the skills necessary for the calculation and design of heat supply systems, the selection of equipment, as well as the development of schemes for heat supply systems for populated areas and individual objects.	6	+				+				

42	Boiler plants and steam generators	Formation of students' knowledge on the classification, principles of operation and the main characteristics of boiler plants and steam generators, methods of efficient fuel combustion, temperature and water regimes of boiler houses. Possession of skills in thermal, aerodynamic and hydraulic calculation of boilers, organization of efficient fuel combustion in various furnace devices, analysis of work processes in the tracts of boiler plants and steam generators.	6	+		+	+					
43	Superchargers and heat engines	Formation of students' knowledge, skills and abilities of using modern compressors of various types, superchargers, fans, steam and gas turbines used in the energy sector of industrial enterprises, using the methods of technical and economic indicators of their work. Familiarization with the hydro-gas-dynamic processes occurring in the machines under consideration, the calculation of the main characteristics of the machines, the principles of equipment selection.	5	+		+						
44	Safety in power plants	Familiarization of students with the legislation of the Republic of Kazakhstan in the field of labor protection, with the basic requirements for the organization of safe operation of main and auxiliary heat and power equipment of enterprises and industries, safety rules for electrical installation and commissioning, operation and repair of power equipment, measures to prevent accidents and accidents at work.	5	+		+						
The PD/EC cycle												
45	Autonomous heat supply	Formation of skills necessary to understand the processes and phenomena associated with the heat supply system. Acquisition by students of theoretical knowledge and practical skills on the basics of design, installation and operation of autonomous heat supply systems, on the use of methods for determining calculation indicators for the design of autonomous heat supply systems, knowledge of modern technological equipment of autonomous heat supply systems.	5	+				+			+	

46	Steam and gas turbines	Formation of knowledge on the types, designs, thermal schemes of steam and gas turbines, the features of their operation. Developing the skills to analyze the current state of steam turbine equipment and formulate recommendations for improving the energy efficiency of the main equipment, master the methodology for calculating steam and gas turbines, as well as the ability to compare, formulate conclusions, build their own arguments, express and justify their position.	6	+		+						
47	Engineering systems of buildings and structures	Study of general information on water supply, sewerage, hydraulics of cities and towns. Study of general information on the water supply of buildings. Internal sewerage of buildings and structures. Sewerage and sanitary cleaning of cities. Features of sanitary maintenance of certain types of structures.	5	+			+					
48	High temperature processes and installations	The study of types of high-temperature heat engineering installations, their characteristics, principles of operation, features of operation and their scope. Possession of methods of operation of reactors and energy sources of high-temperature heat technological installations; be able to put into practice the principles of organization of technological processes, determine their individual stages in thermal reactors, structural diagrams of high-temperature thermal technological installations.	5	+				+			+	
49	Pumps, fans and compressors in systems of heat gas supply and ventilation	Formation of students' knowledge, skills and application skills of modern compressors of various types, superchargers, fans used in heat and gas supply and ventilation systems. Familiarization with the hydro-gas dynamic processes occurring in the machines under consideration, the methodology for calculating the main characteristics of machines and equipment selection, the principles of organizing economical, reliable and safe operating modes of equipment.	6	+		+						
50	Implementation of technological processes and	Training of specialists for the implementation of environmental technical policy in the design, installation and operation of thermal power equipment	6	+		+	+					

	environmental technologies at thermal power plants	of thermal power plants. Formation of knowledge in the field of the legislative framework of the environmental policy of the Republic of Kazakhstan, methods for reducing harmful impurities by modes during the operation of thermal power equipment, technologies and schemes for cleaning waste water and gases from harmful impurities, environmental regulation of harmful emissions.										
51	Operation modes of thermal power plants	Formation of knowledge on the operational characteristics of TPP equipment, the basics of proper technical operation, the main causes of emergencies, operating modes of station equipment. Possession of methods for maintaining rational modes of operation of thermal power equipment of thermal power plants, ensuring reliable, economical and safe operation of the main and auxiliary equipment in the process of fulfilling the dispatcher load schedule.	5	+		+	+					
52	Theoretical foundations of thermal power plants	Familiarization of students with the main characteristics and operating parameters of power plants, electrical and thermal loads of thermal power plants, basic thermal diagrams, their elements and technical and economic indicators of the operation of power units of thermal power plants and IES. Possession of methods for determining the needs of enterprises in thermal and electrical energy, replenishment of steam and condensate losses, principles for constructing and calculating thermal schemes of thermal power plants.	6	+			+					
53	Thermal power systems and energy use	Formation of knowledge: general principles, structure and functioning of sources and systems of heat and power supply; the basics of designing heat supply systems for industrial enterprises and the public sector, understanding the principles of building a heat and power system of an industrial enterprise, applying the acquired knowledge to calculate thermal schemes of heat sources, determining the need for steam and hot water for industrial consumers and the public sector.	6	+			+					
54	Calculation of efficiency in thermal power engineering	Providing training in the field of economics and organization of heat and power production, which	5	+							+	

		allows future specialists to navigate technical and economic information, use economic principles, laws and methods to effectively solve technological problems, principles and methods of organization, production, production processes that arise in the process of engineering activities.										
55	Operation of heating equipment	Study, equipment, technology and features of operation of heat engineering installations. Acquaintance with the regulatory documentation for the organization of operational work, with supervision during the manufacture, installation, commissioning, testing and commissioning of manufactured products and objects. Preparing students to lead a team of performers, make decisions, determine the order of work.	5	+			+					
56	Repair and operation of power equipment	Teaching students theoretical and practical knowledge, which allows, with scientific validity and technical and economic feasibility, to assign optimal turnaround periods for power equipment and improve the system of technological maintenance and repair. The acquisition by students of the knowledge and skills necessary for free orientation in the practice of operating the main and auxiliary heat and power equipment.	5	+			+					
57	Multimedia technologies (Minor)	The discipline provides features and procedure of designing multimedia objects, processing of multimedia information, functionality of modern programs and information and communication technologies used to create and modify multimedia products to solve practical problems in professional activities.	5									+
58	Environmental technologies in fuel combustion	Formation of students' knowledge about the harmful factors that arise when fuel is burned on thermal power equipment, ways to minimize and suppress them; ability to apply methods for determining the characteristics of emissions of harmful substances and their impact on the environment; acquisition of practical skills in regulation of emissions, radiation safety and payment for harmful emissions.	6	+		+	+					