Considered
at the meeting of the Academic
Council of the University
Minutes No. __
from "__" ____ 2019

APPROVED
Chairman of the Board
“S. Seifullin Kazakh Agrotechnical
University” JSC
_____ A.K. Kurishbayev
"____" _____ 2019

EDUCATIONAL PROGRAM
"Electric Power Engineering"

Code and classification of the field of education	6B07 Engineering, manufacturing and construction industries
Code and classification of areas of training	6B071 Engineering and engineering
Code in the International Standard Classification of Education	0710
Awarded degree	bachelor
Training period	4 years
Form of study	full-time
Language of instruction	state / Russian

Nur-Sultan, 2019

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The team of authors was approved by the order of “S. Seifullin Kazakh Agrotechnical University” JSC
No. 932-N of 12.12.2018

Educational program " Electric Power Engineering "
Considered at a meeting of the department "Power supply"
Minutes No. 13 of 04/18/2019

Head of the Department of "Power supply" G.G. Tatkeeva

approved by the Faculty Council
Minutes No. 12 of 04.24.2019

Dean of the Faculty of Energy S.S. Isenov

Content

1 Passport of the educational program

1.1 The purpose of the educational program

The main purpose of the educational program is to provide basic training in service and operational activities at electric power facilities.

In general, the tasks of the professional activity of specialists in the power supply systems of industrial enterprises, agro-industrial complex, cities and towns are: maintaining electrical installations in working order; training and organization of work of operational, maintenance and operational personnel; perception of information about the state of electrical installations and its awareness, i.e. detection of deviations in the controlled processes of generation, conversion, distribution, transmission and consumption of electrical energy; determining the degree of need for intervention in the operation of electrical installations, in the event of deviations; development of alternative interventions; comparison of solution alternatives in terms of efficiency and reliability; making a decision, implementing it and adjusting the results, depending on the further course of the process.

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

Competitive advantages

The educational program "Electricity" was developed in accordance with the National Qualifications Framework and Professional Standards, agreed with the Dublin descriptors and the European Qualifications Framework, on the basis of state general education standards of education at all levels of education (Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 604) ...

The educational program is aimed at training personnel for the implementation of professional activities in the field of determining the optimal production and technological modes of operation of electric power facilities, the development of promising projects of electric power plants for various purposes, performing technological calculations for the selection and adjustment of electrical equipment, determining the operating modes and standardization of technological processes, managing operating modes equipment of electric power enterprises, verification of measuring instruments, diagnostics and preparation of plans for the repair of technological equipment in installations of various voltage levels of electric power enterprises, diagnostics, maintenance and current repair of electric power equipment.

During their studies, bachelors master the body of knowledge on technology, means, methods and methods of production, transmission, distribution and consumption of electricity. Based on this, all subjects studied at the university are closely related to each other and have integrity for the development of the following areas of energy: electrical networks and systems, stations and substations, relay protection and automation, power supply for various industries.

In the system of activities, as the preferential activities of graduates in the educational program
"Electric power engineering", service and operational activities are accepted. In addition to these core activities, graduates prepare for the basics of organizational management activities. The emphasis on preparation for a specific activity is consistent with employers.

The standard term for mastering the educational program for full-time education is 4 years. The complexity of the student's mastering of the educational program "Electric Power", indicated in credits for the entire period of study in accordance with the State Educational Standard of the Republic of Kazakhstan, is at least 240.

3 Competence model (portrait) of a graduate

3.1 The areas of professional activity

The sphere of professional activity is the field of science and technology, which includes a set of means and methods of human activity aimed at creating conditions for the production, transmission, distribution and consumption of electricity.

3.2 Professional activities

Bachelors in the direction of training "Electricity" can perform service and operational types of professional activities.

At the same time, the professional and practical activities of the graduate are associated, first of all, with the introduction and operation of modern electric power equipment, new systems of technical diagnostics, elements of the electric power complex, technical measures and preparation for the implementation of projects aimed at increasing reliability and reducing accidents in the electric power industry.

Service and operational activities:

-checking the technical condition and residual life;

-organization of preventive examinations, diagnostics and current repairs at the objects of professional activity;

- preparation of applications for equipment and component parts, as well as preparation of technical documentation for repairs;

-analysis and adaptation of electrical equipment of domestic and foreign manufacturers to work in domestic and foreign power systems;

-determination of optimal production and technological modes of operation of electric power facilities;

- verification of measuring instruments, diagnostics and drawing up plans for the repair of technological equipment, maintenance and current repair of electrical power equipment.

Objects of the graduate's professional activity:

-electric stations and substations;

-electric power systems and networks;

- power supply systems for cities, industrial enterprises, agriculture,

-electrotechnical laboratories, measuring complexes.

3.3 General educational competencies

- have basic knowledge in the field of natural science (social, humanitarian) disciplines that contribute to the formation of a highly educated personality with a broad outlook and culture of thinking;

- know social and ethical values based on public opinion, traditions, customs, social norms and be guided by them in their professional activities; know the traditions and culture of the peoples of Kazakhstan; knowledge in the field of healthy lifestyle formation;

- be able to use basics legal systems and legislation of Kazakhstan;
- be able to adequately navigate in various social situations;
- be able to use independently means, methodically correct methods of physical education and health promotion;
- comply with the norms of business ethics, possess ethical and legal norms of behavior;
- be tolerant of the traditions and culture of other peoples of the world;
- know the trends of social development of society;
- have the ability to live effectively and function successfully in social interaction: to change and adapt to discussion and reaching agreement with others;
- maintain relations in the professional community, bear social responsibility for the results of their professional work;
- to have a readiness to achieve the proper level of physical fitness to ensure full-fledged social and professional activity.

3.4 Core competencies

In accordance with general personal knowledge, abilities and skills, competencies, the bachelor must:

- develop and apply mathematical ways of thinking in their professional activities; use the basics of natural science knowledge and methodology to identify production problems and solve professional problems;
- possess basic knowledge in the field of economic, management disciplines (sciences); have the ability to engage in self-study, be able to effectively manage time and information;
- know the principles of building a drawing and the main provisions of ESKD standards for the implementation and execution of drawings and text documents; read and execute technical and electrical drawings, as well as textual documentation to them; possess the techniques and skills of performing graphic documentation using modern computer graphics;
- know the basic physical laws, phenomena and processes on which the principles of action of objects of professional activity are based; to use the appropriate physical and mathematical apparatus for solving applied problems; possess the skills of mathematical description of physical processes and solving typical problems within the framework of professional activities, the ability and willingness to use regulatory legal documents in their professional activities;
- know the methods of geometry and engineering graphics, state standards used in the graphic representation of electrical schematic diagrams, functional and structural diagrams; carry out preliminary design of individual units of the electric power and

electrical equipment, graphically display electrical, functional and structural diagrams;

- possess the skills of using specialized packages of applied computer programs;
- possess the skills of acquiring new knowledge necessary for daily professional activities and continuing education in the magistracy;
- strive for professional and personal growth;
- have the ability for a holistic and systematic analysis of the problems of modern life in society and the environment, the ability to diagnose the production situation, make reasonable decisions;
- develop management solutions.

3.5 Professional competencies

Determine the technical characteristics, design features, operating modes and rules for the technical operation of power equipment;

Formulate the main technical and economic requirements, determine the parameters of the optimal operating mode; choose the composition of equipment and its parameters, as well as schemes of electric power facilities;

Control over the quality of functioning, modernization and improvement of technical and economic indicators of electrical installations;

Carry out metrological verification of the main measuring instruments and ensure compliance with all specified parameters of the technological process of generation, distribution and use of electricity;

Draw up and execute operational documentation provided for by the rules for the operation of equipment and organization of work;

Draw up and execute operational documentation when carrying out installation, commissioning, repair and maintenance work at electric power facilities.

Know the planning, organization and technology of installation work, adjustment work and repair work of electric power equipment;

Know the basics of developing project documentation, the methodology for typical electrical calculations;

Know the rules for the design and safety of work on electrical installations, methods and methods of work during the adjustment and experimental testing of electrical and electrical equipment

4 The base of passing professional practices

Professional practice is the practical development in production of professional skills and abilities in accordance with the future specialty and specialization. Professional practice is of three types: educational, industrial and pre-diploma.

Educational practice is designed to get acquainted with the specifics of future professional activities, acquire skills in solving practical professional problems.

The industrial practice has the goal of obtaining skills in the practical use of the theoretical professional knowledge.

In the pre-diploma practice, the student collects and systematizes the source materials for the implementation of the diploma project (work).

In connection with the demand in the electricity infrastructure market and the needs of the society of undergraduate graduates in the educational program "Power Engineering", practical training is carried out at the leading enterprises in the electric power industry in the Republic of Kazakhstan, such as KEGOC JSC, “Samruk Energo” JSC, "AREK" JSC, "Astana-REC" JSC, "KokshetauEnergo" LLP, "KaragandaZharyk" LLP, "Tavrida Electric Astana" LLP, "Astanaenergoservice" LLP, "Ekibastuz GRES" LLP, "MAEK-Kazatomprom" "Kazakhenergoexpertiza" JSC and others.

5 The structure of the educational program

No.	Names of cycles and disciplines	Total labor intensity	
		in academic hours	in academic credits
1	2	3	4
1	**Cycle of general education disciplines (OOD)**	**1680**	**56**
1)	Required component	1530	51
	Modern history of Kazakhstan	150	five
	Philosophy	150	five
	Foreign language	300	10
	Kazakh (Russian) language	300	10
	Information and Communication Technologies (in English)	150	five
	Culturology and Psychology	120	four
	Political Science and Sociology	120	four
	Physical education	240	eight
2)	Component of choice	150	five
	Introduction to Electricity	150	five
2	**Cycle of basic disciplines (DB)**	**3390**	**113**
1)	University component	1920	64
	Professional Kazakh (Russian) language	120	four
	Professionally oriented foreign language	120	four
	Mathematics I	150	five
	Mathematics II	120	four
	Physics	120	four
	Engineering graphics	120	four
	Installation of electrical equipment for power supply systems	90	3
	Theoretical Foundations of Electrical Engineering I	240	eight
	Electrical materials	90	3
	Mathematical problems in the electric power industry	120	four
	Electro-technological installations of industrial enterprises	150	five
	Basics of Automation	150	five
	Electrical measurements	150	five
	Theoretical Foundations of Electrical Engineering II	180	6
2)	Component of choice	1470	49
	Converter technology in the power industry	150	five
	Automated control systems in power supply	120	four
	Isolation and overvoltage	120	four
	Operation and repair of electrical equipment	90	3
	Safety in electric power installations	180	6

	Energy saving in the electric power industry	90	3
	Economy of energy enterprises	150	five
	Study practice	30	one
	Internship	90	3
	Internship	150	five
	Internship	300	10
3	**The cycle of profiling disciplines (PD)**	**1770**	**59**
1)	University component	1290	43
	Industrial electronics	120	four
	Power supply	150	five
	Electrical networks and systems	240	eight
	Relay protection and automation of electric power systems	210	7
	Design of power supply systems	240	eight
	Engineering thermodynamics	150	five
	Electric cars	180	6
2)	Component of choice	480	sixteen
	Transient Processes	150	five
	Automated electric drive	150	five
	Power stations and substations	180	6
4	Additional types of education (FEB)		
1)	Component of choice		
5	**final examination**	**360**	**12**
1)	**Writing and defense of the thesis (project) or preparation and passing of a comprehensive exam**	**360**	**12**
	Total	**7200**	**240**

Appendix 1. Academic calendar ***

Course		September				October					November				December				January					February				March				April						
	MON	one	2	3	four	five	6	7	eight	nine	10	eleven	12	13	fourteen	fifteen	sixteen	17	eighteen	nineteen	twenty	21	22	23	24	25	26	27	28	29	thirty	31	32	33	34	35	36	37
I		...	...	...	...	...	...	...	./RK	...	...	...	...	...	...	./RK	FROM	FROM	FROM	TO	TO	...	...	...	...	...	...	...	./RK	...	...	...	...	...	...	./RK	FROM	FROM
II		...	...	...	...	...	...	...	./RK	...	...	...	...	...	...	./RK	FROM	FROM	TO	TO	...	...	...	...	...	...	...	./RK	...	...	...	...	...	...	./RK	FROM	FROM	Etc

MON - presentation week

● - theoretical training

RK - midterm control

FROM - examination session

L - summer semester

Yn - educational practice

Etc - Internship

TP - technological practice

Pd - undergraduate practice

Holidays:

thirty August- Constitution day

24 september- Kurban Ait

December 1- Day of the First President

December 16, 17- Independence Day

January 1, 2- New Year

Jan. 7- Nativity

March 8- International Women's Day

March 21, 22, 23- Nauryz meiramy Vseg

The 1 of May- Holiday of the unity of the people of Kazakhstan

May 7- Defender of the Fatherland Day

9th May- Victory Day

6 july- Capital Day

*** Reviewed and approved at the beginning of the academic year

Appendix 2. Working curriculum

No.	Module name	Cycle of discipline	Discipline component	Discipline Code	Name of the discipline	ECTS credits	Types of control	Volume in hours								Distribution of the volume of study hours by semesters / trimesters / quarters											
								Total	Classroom				Out-of-class			one	2	3	four	five	6	7	eight	nine	10	eleven	12
									Lectures	Practicalclasses	Laboratory exercises	Other (practice)	SROP	SRO	preparation and passing of intermediate and final												
	General educational disciplines	OOD	OK	KRYa1103	Kazakh (Russian) language	10	exam	300		100			40	160		four	3	3									
		OOD	OK	IYa1101	Foreign language	10	exam	300		100			40	160		3	3	four									
		OOD	OK	IKT1106	Information and communication technologies	five	exam	150	twenty		thirty		twenty	80		five											
		OOD	OK	KP1108	Culturology and Psychology	four	exam	120	twenty	twenty			sixteen	64				four									
		OOD	OK	SIKG1104	Modern history of Kazakhstan (GE)	five	exam	150	twenty	thirty			twenty	80				five									
		OOD	OK	F2105	Philosophy	five	exam	150	twenty	thirty			twenty	80					five								
		OOD	OK	PS1107	Political Science and Sociology	four	exam	120	twenty	twenty			sixteen	64		four											
		OOD	Kv	VE2102	Introduction to Electricity	five	exam	150	twenty	thirty			twenty	80		five											
	Total OOD					56																					
	Basic disciplines	DB	VC	PKRYa 3222	Professional Kazakh (Russian) language	four	exam	120		40			sixteen	64										four			
		DB	VC	POIYa 3223	Vocationally oriented foreign language	four	exam	120		40			sixteen	64									four				
		DB	VC	M1202	Mathematics I	five	exam	150	twenty	thirty			twenty	80		five											

		DB	VC	M1203	Mathematics II	four	exam	120	twenty	twenty			sixteen	64			four										
		DB	VC	F1205	Physics	four	exam	120	twenty	10	10		sixteen	64			four										

		DB	VC	TOE2209	Theoretical Fundamentals of Electrical Engineering I	eight	exam	240	40	twenty	twenty		32	128					eight												
		DB	VC	TOE2211	Theoretical fundamentals of electrical engineering II	6	exam / Ph.D.	180	twenty	40			24	96						6											
		DB	VC	IG1207	Engineering graphics	four	exam	120	twenty	twenty			sixteen	64			four														
		DB	VC	EM2219	Electrical materials	3	exam	90	10		twenty		12	48							3										
		DB	VC	MZE2220	Mathematical problems in the electric power industry	four	exam	120	twenty	10	10		sixteen	64							four										
		DB	VC	MESE2217	Installation electrical equipment of power supply systems	3	exam	90	10	twenty			12	48						3											
		DB	VC	EI2215	Electrical measurements	five	exam	150	twenty	twenty	10		twenty	80							five										
		DB	VC	EUPP3221	Industrial electrotechnical installations enterprises	five	exam	150	thirty	twenty			twenty	80								five									
		DB	VC	OA2213	Basics of Automation	five	exam	150	thirty	twenty			twenty	80					five												
		DB	Kv	PTE3206	Conversion technology in power industry	five	exam	150	twenty	thirty			twenty	80							five										
		DB	Kv	IP4210	Isolation and overvoltage	four	exam	120	twenty	twenty			sixteen	64											four						
		DB	Kv	ASUE3208	Automated power supply control systems	four	exam	120	twenty		twenty		sixteen	64								four									
		DB	Kv	ERE4201	Operation and repair of electrical equipment	3	exam	90	10		twenty		12	48											3						
		DB	Kv	EEP4214	Economy of energy enterprises	five	exam	150	thirty	twenty			twenty	80																five	
		DB	Kv	TBE4204	Safety in electric powerinstallations	6	exam	180	thirty	fifteen	fifteen		24	96											6						
		DB	Kv	EE3212	Energy saving in the power industry	3	exam	90	10	twenty			12	48									3								
	Total DB					113																									
		PD	VC	EM3302	Electric cars	6	exam / Ph.D.	180	thirty	10	twenty		24	96								6									

		PD	VC	E3304	Power supply	five	exam	150	twen ty	twe nty	10		twent y	80								five							
		DB	VC	RZAES 4308	Relay protection and automation electric powersystems	7	exam / Ph.D.	210	thirty	10	thirty		28	112												7				

		DB	VC	PE2301	Industrialelectronics	four	exam	120	twenty		twenty		sixteen	64							four								
		PD	VC	ESS3307	Electrical networks and systems	eight	exam / Ph.D.	240	40	10	thirty		32	128										eight					
		PD	VC	IT2310	Engineering thermodynamics	five	exam	150	thirty	twenty			twenty	80				five											
		PD	VC	PSE4309	Design of power supply systems	eight	exam / Ph.D.	240	twenty	60			32	128															eight
		PD	Kv	PPE3306	Transient Processes	five	exam	150	twenty	twenty	10		twenty	80								five							
		PD	Kv	AE4303	Automatedelectric drive	five	exam	150	twenty	10	twenty		twenty	80											five				
		PD	Kv	ESP3305	Power stations and substations	6	exam / Ph.D.	180	thirty	10	twenty		24	96									6						
	Total PD					59																							
		OOD	OK		Physical education	eight	exam	240		240						one	2	one	2	one	one								
		DB	Kv	UP1216	Study practice	one	exam	thirty										one											
		DB	Kv	PP4218	Internship	eighteen	exam	540													3			five		10		
	final examination				State examination in the specialty or writing and defense of the thesis (project)	12	exam	360																					12
	Total					**240**										**22**	**tw**	**eig.**	**tw**	**tw**	**tw**	**tw**	**tw**	**tw**	**25**	**10**	**25**

Appendix 3. Description of the disciplines of the OOD cycle

Basic information about the discipline:	
1.Name of the discipline	Modern history of Kazakhstan
2. Number of credits	**five**
3. Prerequisites:	School basic knowledge
4. Post-requisites:	cultural studies, political science, philosophy, sociology
5. Competencies:	Demonstrate knowledge of the main periods of the formation of an independent Kazakhstani statehood; to relate the phenomena and events of the historical past with the general paradigm of the world-historical development of human society through critical analysis; master the techniques of historical description and analysis of the causes and consequences of events in the modern history of Kazakhstan; offer a possible solution to modern problems based on an analysis of the historical past and reasoned information; analyze the security and importance of the modern Kazakhstani development model; to determine the practical potential of intercultural dialogue and respect for the spiritual heritage; substantiate the fundamental role of historical knowledge in the formation of Kazakhstani identity and patriotism; form your own civic position on the priorities of mutual understanding, tolerance and democratic values of the modern society.
6. Course author	Department of History of Kazakhstan
7. Basic literature	1.Modern history of Kazakhstan [Text]: a textbook for students of non-historical specials. (bachelor's degree) higher. study. institutions / B. G. Ayagan [and others]. ; ed. B.G. Ayagan; Institute of history of the state-va M-va education and science of the Republic of Kazakhstan. - Almaty: Rarity, 2010, 2.Aminov T.M. Modern history of Kazakhstan. Tutorial. Almaty., 2017 3.Nazarbayev N.A. The era of independence. - Almaty: ҚАZақ-parat, 2017.4. Nurtazina R.A. National security of the Republic of Kazakhstan: textbook. - Almaty: Bastau, 2014 5. Ertlesova J. Reforms of the 90s: interviews with key participants in the events. - Almaty, Atamura. - 2016.
8. Content of the discipline	Introduction to the discipline. Kazakhstan on the way to independence stages of formation of the nation state. Civil and political confrontation. Implementation of the Soviet model of state building. Contradictions and Consequences of Soviet Reforms in Kazakhstan in the Second Half of the 20th Century. The policy of "perestroika" in Kazakhstan. Kazakhstan model of economic development. Social modernization is the basis for the well-being of society. Ethno-demographic processes and strengthening of interethnic harmony. Socio-political development prospects and spiritual modernization. The policy of forming a new historical consciousness of the people Great steppe. Kazakhstan is a state recognized by the modern world. N.A. Nazarbayev is a personality in history. Formation of a nation of a united future.

Basic information about the discipline:	
1.Name of the discipline	Philosophy
2.Number of credits	**five**
3. Prerequisites:	Political science, Culturology and psychology, Modern history of Kazakhstan
4. Post-requisites:	History and philosophy of science
5. Competencies:	Formation of openness of consciousness, understanding of one's own national code and national self-awareness, spiritual modernization, competitiveness, realism and pragmatism, independent critical thinking, cult of knowledge and education.
6. Course author	Department of Philosophy
7 main literature	1. Petrova V.F., Khasanov M.Sh. "Philosophy". - Almaty: Evero, 2014. 2. Bertrand R. "History of Western Philosophy" - M .: Publisher Litres, 2018. - 1195 from. 3. Kenny A. New History of Western Philosophy. Volume 1-4. - Oxford University Press, 2006 - 2010. (Kenny A. New History of Western Philosophers. Volum 1-4 - Oxford University Press, 2006-2010)

8. Content of the discipline	The emergence and development of philosophy. Fundamentals of a philosophical understanding of the world. Consciousness, soul and language. Being. Ontology and metaphysics. Philosophy of man and value world. "Mangilik El" and "Rukhani Zhagyru" are the philosophy of the new Kazakhstan.

Basic information about the discipline:	
1.Name of the discipline	Foreign language
2. Number of credits	**10**
3. Prerequisites:	Foreign language school course
4. Post-requisites:	Professionally oriented foreign language
5. Competencies:	Based on the results of mastering the program, the student, depending on the level preparation, the student at the time of completion of the course reaches the level B1- (IELTS 4.0-5.0) or B2- (IELTS5.5-6.0)
6. Course author	Department of Foreign Languages
7. Main literature	1. Julie Lachance (July 21, 2015). Practice Makes Perfect Premium: Basic English. McGraw-Hill Education; 2 edition 2. Chris Lele. (March 20, 2018) The Vocabulary Builder Workbook: Simple Lessons and Activities to Teach Yourself. Zephyros Press; Workbook edition 3. Deborah Capras (01 Jan 2015). Small Talk: B1 +. HarperCollins Publishers. 4. Mark Hancock (27 Apr 2017). English Pronunciation in Use Intermediate Book with Answers and Downloadable Audio. CUPRESS. 5. Katie Foufouti (28 Dec 2017). Oxford Skills World: Level 4: Reading with Writing Student Book / Workbook. Oxford University Press 6. Herbert Puchta, Jeff Stranks, Peter Lewis-Jones (31 Oct 2015). Think (SB + audio, WB + audio, TB, Tests - levels 1, 2, 3, 4). 7.British National Corpus: http://www.natcorp.ox.ac.uk 8. The Corpus of Contemporary American English (COCA):http: //www.americancorpus.
8. Content of the discipline. The course program is designed for the volume of teaching - 300 hours, of which: 90 hours - for classroom work and 180 hours - for independent work. The course ends with a comprehensive exam. The course is designed for 2 semesters. Active dictionary-1200-1500 words, passive dictionary 1500-1800. Formation of reading skills with almost complete understanding of authentic without special vocabulary in the presence of 10% unfamiliar words. The formation of the ability to independently write a note, a private letter, a greeting card, a questionnaire, a form, a customs declaration, a message plan (more than 20 sentences without a dictionary). Formation of the ability to listen to authentic messages up to 2 minutes with understanding plot and point of view of the speaker. Formation of the ability of oral communication with a duration of 2-3 in a monologue and the ability to participate in a spontaneous dialogue).	

Basic information about the subject	
1.Name of the discipline	Kazakh language
2.Number of credits	**five**
3. Prerequisites	A1, A2 - theoretical and practical knowledge corresponding to the basic levels
4. Post-requisites	Professional Kazakh language
5. Competence	Studying the language system of the Kazakh language and its ways through cultural and intercultural activities, improving the speech skills of language learners based on texts on everyday, social topics, forming lexical and grammatical skills.
6.Information about teachers	Department of Kazakh and Russian languages
7. Main literature	1. Abduova B.S., Asanova U.O. Kazakh language: A guide for Russian-speaking groups. - Astana, 2017.-282b. 2.Aitbaeva B.M. Kazakh language textbook (level B1). - Karaganda, 2014 .-- 205 from. 3. Bozbaeva-Hung A.T., Balabekov A.K., Dosmambetova G.K., Salykova B.O., Khazimova A.Zh. Kazakh language: middle-level textbook. National Testing Center. - Astana: 2017. 4. Dosmambetova G.K., Balabekov A.K., Bozbaeva-Hung. - Astana, 2014. 5. A.T. Seisenova Kazakh language: an entry-level textbook. National Testing Center. - Astana, 2016.

	6. Kuzekova Z.S., Baitelieva Yu.D. Kazakh language: middle-level textbook. - Astana, 2016. 7. Keksekova Z.S., Baytelieva Yu.D. Kazakh language: textbook for universities. - Astana, 2016. 8. Rezuanova G.K. Kazakh language.- Astana. 2016.2017
8. Brief description of the discipline	This subject is intended for first-year university students. The educational and methodological complex consists of a text and several practical tasks, depending on the text. Linguistic features and national cognitive qualities of the Kazakh language are taken into account. Since the Kazakh language course is based on a sample curriculum, topics in this program are taught. Studying the discipline, the student is used to speaking competently, culturally in Kazakh language, freely and as accurately as possible express your point of view.

Basic information about the discipline:	
1.Name of the discipline	Russian language
2. Number of credits	**five**
3. Prerequisites:	School Russian language course
4. Post-requisites:	Professional Russian
5. Competencies:	Know: Fundamentals of the theory of speech communication; speak correctly and clearly; know the rules of the Russian language. Freely and correctly express your thoughts in oral and written form; argue your point of view; in the process of studying the Russian language, students will be able to freely formulate conclusions, build their own argumentation, express and substantiate their position. Be able to: know the basics of the theory of argumentation, logic, the basic rules of the Russian language, the norms of the Russian literary language and speech etiquette; in the field of communication - students must improve their skills and abilities of practical knowledge of the Russian language. Master: develop students' in-depth language and communicative competence based on the language of the specialty, methods of argumentation, the norms of the modern literary language; experience in presenting information in the process of communication in the field of the chosen profession; form speech and communicative competence.
6. Course author	Department of Kazakh and Russian languages
7. Main literature	1. "Russian language. Textbook for students of Kazakh departments of universities (bachelor's degree) "- Edited by Akhmedyarov K.K., Zharkynbekova Sh.K., Mukhamadieva Kh.S. - Almaty, Kazakh university, 2012. 2. Mukhamadiev Kh.S. "A guide to the scientific style of speech. Russian language". - Almaty: Kazakh University, 2011 .-- 181 p. 3. "Fundamentals of Scientific Speech": A textbook for students of non-philological higher educational institutions / N.A. Bure, M.V. Fast, S.A. Vishnyakova and others; Edited by V.V. Khimik, L.B. Volkova. - St. Petersburg .: Faculty of Philology St. Petersburg State University; M .: Publishing Center "Academy", 2003. - 272 p. 4. Pavlova TV, Adskova “Instrumental case. Russian language: scientific style. Working with text ": A textbook for students specialties 5B070800 "Oil and gas business", 5B072100 "Chemical technology of organic substances", 5B070600 "Geology and exploration 5.Albekova A.Sh. Russian language. - Astana, 2005.
8. Content of the discipline. Language and its main functions. Language as a means of communication and its role in the life of society. Russian language as one of the world languages and its role in the modern world. Legal and regulatory framework for the functioning of the Russian language in Kazakhstan (the Constitution of the Republic of Kazakhstan, the Law on the Languages of the Republic of Kazakhstan, State programs for the development and functioning of languages in the Republic of Kazakhstan). Text as the main unit of communication. Types and forms of speech activity. Functional and semantic types of speech. Written and oral form of the language. Types of texts and their functional and stylistic variety. Functional and semantic types of speech: description, narration, reasoning. Textual model of scientific reasoning. Functional styles of the language. Art style. Individual artistic style of the writer. Conversational style. Language features of the spoken style. Formal and business style. Service documentation for internal use. Service documentation for internal use. Scientific style. Characteristic features of the scientific style. Text as the main unit of verbal communication. Textual model of scientific description. Scientific	

storytelling as a source of information. Textual model of scientific narration. Types of scientific information. The essence of the subject and its function. Structural and semantic analysis of a scientific text. Elements of structural and semantic analysis of the text. Monologue and dialogical speech. Forms of educational and scientific discussion. The communicative task of a scientific text. Logical-semantic relations in a sentence. This and new information of the scientific text. Forms of expression of new information in the text. Methods for the development of information in the text. Unidirectional and multidirectional scientific texts. Microtheme of the scientific text. Basic and additional information in the text. Fundamentals of scientific text compression. Basic and additional information of the text. Types of additional information. Plan as a structural and content component of a scientific text. Annotating a scientific text. Types of annotation. Referencing the scientific text Language of the specialty and professional culture of speech. Educational and scientific communication Speech aspects of business communication. Types and causes of language errors and communication failures. Typology of speech errors. Ethics and etiquette of business speech and professional communication.

Basic information about the discipline:	
1.Name of the discipline	Information and Communication Technologies (in English)
2. Number of credits	**five**
3. Prerequisites:	High School Computer Science Course
4. Post-requisites:	Algorithmization and programming on the languages high level;Programming in telecommunication and radio-electronic systems
5. Competencies:	Know: - major trends in information and communication technology; - economic and political factors contributing to the development of information and communication technologies; - features of various operating systems. - use information resources to search and store information Be able to: - work with spreadsheets, perform data consolidation, build graphs; - work with databases; - apply methods and means of protecting information; - design and create websites; - to process vector and raster images; - create multimedia presentations; - use different social platforms for communication. Master: - skills of using modern information technologies in everyday life and in educational activities.
6. Course author	Department of Information and Communication Technologies
7. Main literature	1. Shynybekov D. Information and communication technologies. Part 1. - Almaty: MUIT., 2017 .-- 587 p. (In the KATU library) 2 .. Shynybekov D. Information and communication technologies. Part 2. - Almaty: MUIT., 2017 .-- 587 p. (In the KATU library) 3. Nurpeisova, TB Information and Communication Technologies: textbook / TB Nurpeisova, IN Kaidash: Ministry of Education and Science of the Republic of Kazakhstan. - Almaty: Bastau, 2017 .-- 480 p.(In the KATU library) 4. Williams Brian K., Sawyer Stacey C. Using Information Technology: A Practical Introduction to Computers & Communications. Complete Version. - New York: Mc Graw Hill, 2013 .-- 576 p. 5. Microsoft Excel 2010, EXAM 77-885: textbook Hoboken: John Wiley & Sons, Inc., 2012 .-- 247 p. 6. Microsoft Access 2010, textbook. Hoboken: John Wiley & Sons, Inc., 2012 .-- 225 p. 7. Rose, K. Learn by yourself Adobe Photoshop Eng .: popular science literature / K. Rose, K. Binder; Trans. with English. - M .: ID Williams, 2008 .-- 512 p. (In the KATU library) 8. Peter L Dordal An Introduction to Computer Networks. Department of Computer Science. Loyola University. Chicago. 2015 .-- 621 p. 9. Olifer V., Olifer N. Computer networks. Principles, technologies, protocols: a textbook. St. Petersburg: Piter, 2016. - 992 pp. (In the KATU library). 10. Gary David Bouton CorelDRAW X7: The Official Guide. 11.th Edition. Corel Corparation.London, 2013 .-- 657 p.
8. Content of the discipline. Data analysis. Data management. Database systems. Networks and telecommunications. Cyber security. Internet technologies. Cloud and mobile technologies. Multimedia technology. Smart Technologies: IoT, Big Data, Block chain. Artificial Intelligence. Green technologies in ICT. Teleconference. E-technology. E-business. E-learning. E-government. Professional information technology. Industrial ICT.	

Basic information about the discipline:	
1.Name of the discipline	Culturology and Psychology
2. Number of credits	**four**
3. Prerequisites:	Basic school knowledge
4. Post-requisites:	Philosophy, history and philosophy of science
5. Competencies:	Algorithmically represent the use of scientific methods and research techniques in the context of a specific academic discipline and in the procedures for the interaction of disciplines of the module; reasonably and reasonably provide information about the various stages of development of the Kazakh society, political programs, culture, language, social and interpersonal relations; analyze various situations in different areas of communication from the standpoint of correlation with the system values, social, business, cultural, legal and ethical norms of the Kazakh society.
6. Course author	Department of Philosophy
7. Main literature	1. Akimbekov S.M. History of the steppes: the phenomenon of the state of Genghis Khan in the history of Eurasia. - Almaty: Institute of Asian Studies LLP. 2nd edition, revised and enlarged, 2016. 2. Grushevitskaya T.G. Culturology: textbook. allowance / T.G. Grushevitskaya, A.P. Sadokhin. - M .: Alpha-M: INFRA-M, 2015. 3. Danilyan O.G. Culturology: textbook / O. G. Danilyan, V. M. Taranenko. - 2nd ed. - M .: INFRA-M, 2014. 4. Myers D. Aleumettik psychology. Social Psychology. / D. G. Myers, J. M. Tuenge; aud. G. Қ. Aykynbaeva [female tb.]. - 12-bass. - Astana: "lttyk audarma burosy" ҚҚ, 2018. - 559 b. 5. Psychology of Individual Differences / Ed. Yu.B. Gippenreiter, V. Ya. Romanov. - 3rd ed., Rev. and add. - M .: AST: Astrel, 2008 .-- 720 p. 6. Rudenko A.M. Psychology in diagrams and tables: a tutorial. - M: Phoenix, 2016 .-- 379 p. 7. Shultz D. Kazirgi psychology of tarikhi. A History of Modern Psychology: / D. Schultz, S. E. Schultz; aud. B. Қ. Aқyn [zhəne tb.]. - 11-bass. - Astana: "lttyқ audarma burosy" ҚҚ, 2018. - 447 [1] b .: sur. - (Rukhani zhagyru).
8. Content of the discipline. The discipline "Culturology" is aimed at the development of a social and 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 understanding the nature of cultural processes, the specifics of cultural objects, the role of cultural values in intercultural communication. The discipline "Psychology" is designed to increase the general psychological culture of a future specialist, to understand his past, present and future from a psychological standpoint, as well as to master the knowledge of social and psychological patterns of personality behavior in interpersonal communication, necessary for the formation / modernization of consciousness in accordance with the challenges of the time in the context programs of the Spiritual Revival of Kazakhstan, Leader of the Nation N.A. Nazarbayev.	

Basic information about the discipline:	
1. Name of the discipline	Political Science and Sociology
2. Number of credits	**four**
3. Prerequisites:	Basic school knowledge
4. Post-requisites:	Philosophy, history and philosophy of science
5. Competencies:	explain and interpret subject knowledge (concepts, ideas, theories) in all fields of science that form the academic disciplines of the module (sociology, political science, cultural studies, psychology); explain the socio-ethical values of society as a product of integration processes in the systems of basic knowledge of the disciplines of the socio-political module; explain the nature of situations in various spheres of social communication on the basis of the content of theories and ideas of scientific spheres of the studied disciplines; analyze the features of social, political, cultural, psychological institutions in the context of their role in the modernization of Kazakhstani society; to correctly express and reasonably defend their own opinions on issues of social significance.
6. Course author	Department of Philosophy
7. Main literature	1. Nazarbayev N.Ә. Kazakhstan Zholy - 2050: Bir maқsat, bir madde, bir bolashak. Kazakhstan Respubliksyn President N.N. Nazarbayevty Kazakstan Khalgyna

	Zholdauy. 2014 zhylyhy 17 қаңtar. 2. Nazarbayev N.Ә. "Kazakhstannyk ushinshi zhangyruy: zhagandyk bosekege kabilettilik" Kazakhstan Respubliksyny President N.N. Nazarbayevtyk Kazakhstan khalkyn Zholdauy. 31 March 2017. 3. Nazarbayev N.Ә. Memleket bashysynyk "Bolashaka baadar: ruhani zhagyru" 12 september 2017. 4. Absattarov R.B. Sayasattan not_zderi. - 2 volumes - Almaty: Karasai, 2011. 5. Heywood A. Politics. - N.-Y .: Palgrave Macmillan, 2013. 6. Mұsataev S.Sh. Sayasi bilik: Ohu uraly. Almaty: Kazakh University. - 2014 7. Alemdik sayasattanu anthologies. "Madeni Mura" memlekettik bағdarlamasy. - Almaty: Kazakhstan. - 2005-2009. - T. 1-9. 8. Kazakhstan way - 2050. -3 t. / Ed. Sultanova B.K. - Almaty: KISI, 2014.
8. Content of the discipline. The module involves the study of four scientific disciplines - sociology, political science, cultural studies, psychology, 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; integrativity; methodological integrity of research approaches these disciplines; commonality of results-oriented learning methodology; a unified systematic representation of the typology of learning outcomes as formed abilities.	

Basic information about the discipline:	
1.Description of the discipline	Physical education
2.Number of credits	**eight**
3.Prerequisites	biology, anatomy, human physiology, hygiene,
4.Post-requisites	The program of the course "Physical culture" develops the abilities and skills in the field of physical culture of students, forms the needs for a healthy lifestyle, preservation and strengthening of health, improves the level of physical fitness for the implementation of their abilities in the process of daily activities.
5.Competence	Ensuring a sufficient level of physical readiness of future specialists, a high level of efficiency; development of professionally significant physical and psychomotor abilities; own methods and means of physical culture to increase the adaptive reserves of the body and strengthen health; possess knowledge and skills of a healthy lifestyle, ways to preserve and strengthen health and their use to maintain health.
6 course author	Shkurkov A.S., Satbaev E.K.
7 main literature	1. IN AND. Ilyinich. Physical culture of the student. Moscow, 2001 2. G. D. Ivanov, A.K. Kulnazarov. Physical education of students. Almaty, 2002 3. Theory and methodology of physical education. Under total. ed. A.P. Matveev and D. Novikov. M., 2005.
8. Content of the discipline. Formation of a positive attitude, interest and need for physical education and sports. Improving the physical health of students on the basis of increasing the arsenal of motor abilities, professionally applied and methodical readiness. Preparation and participation in mass sports and recreation events and competitions in sports, providing for the wide involvement of students in active physical education. Complex use of physical culture and sports means by the type of general physical training. Improving the level of physical and functional state. Preventive use of physical culture means for health-improving purposes. The acquisition by students of additional, necessary knowledge on the basics of psychological, pedagogical, independent exercise and "lifelong" sports.	

1.Description of the discipline	Introduction to Electricity
2. Number of credits	**five**
3. Prerequisites:	physics, mathematics in the scope of the school curriculum
4. Post-requisites:	According to RUE specialty
5. Competencies:	The task of studying the discipline is to master the main features and properties of the electric power system, general information about the power supply of industrial enterprises and populated areas. As a result of studying the discipline, the student must know the place of energy in technical progress; energy resources of the Earth, RK and their varieties; the technological process of generating electricity at power plants, as well as the structural diagram of the power system, types of power plants; on the transmission and distribution of electricity; classification and requirements for electrical networks; new methods of electricity transmission; the main elements of the power supply system and communication between them, their modes of operation; on the environmental problems of energy. To be able to apply knowledge in mathematics and physics to the issues of electric power industry, to use the necessary scientific and technical and educational and methodological literature. Have an idea of the importance of energy in technological progress; about energy resources; about the energy system of the Republic of Kazakhstan; general information about power plants and substations; on systems of transmission and distribution of electrical energy; on the classification of electrical networks; about the structures of overhead and cable transmission lines; on the transmission of electricity over a distance and on new methods of its transmission.
6. Course author	Krasnikov V.I.
7. Main literature	1. Civil Code of the Republic of Kazakhstan. 2.Law of the Republic of Kazakhstan dated November 9, 2004 No. 508-1I "On the Electricity Industry". 3. Law of the Republic of Kazakhstan dated January 13, 2012 No. 541-1V "On energy saving and improving energy efficiency". 4. Demidova G.L., Lukichev D.V. Introduction to the specialty. Power engineering and electrical engineering. Study guide - St. Petersburg: ITMO University, 2016. 5. Venikov V.A., Putyatin E.V. Introduction to the specialty. Electricity - Krasnodar: Kuban GAU, 2014 6. Electrical Installation Rules of the Republic of Kazakhstan (PUE). - 2015. 7. Electricity rules. Approved by order of the Minister of Energy and Mineral Resources on January 24, 2005 No. 10.

8. Content of the discipline. The discipline "Introduction to Electric Power Engineering" stimulates interest in the specialty, reveals its meaningfulness and relevance in modern conditions and contributes to the establishment at an early stage of communication of students with the profiling department. The assimilation of the discipline should contribute to the successful study of basic and specialized disciplines.

The purpose of studying the discipline is to acquire knowledge about the basics of the chosen specialty, the requirements for a specialist and the formation of students' understanding of the basic principles and technologies of production, transmission and use of electricity.

The concept of an electric power system, structure, main elements, functions of the UES of the Republic of Kazakhstan is considered; classification of power plants. General information about the technological process of electric energy production at various power plants; Electricity transmission and distribution. Electricity of the net. Classification and requirements for electrical networks; The use of electricity. Electric drive. Electric heating. Electrotechnology; electricity metering. Electricity tariffs; quality, electricity, power supply. Energy saving; Energy development prospects.

Appendix 4. Description of disciplines of the DB cycle

Basic information about the discipline	
1.Name of the discipline	Professional Russian
2.Number of credits	**four**
3.Prerequisites:	Russian language
4. Post-requisites:	Disciplines teaching in Russian
5.Competence:	Know: - lexical and grammatical structure of the Kazakh language; - - language system and stylistic resources at the lexical and grammatical level; - - language of the specialty (terminological minimum, minimum of speech topics); express themselves in the Kazakh language in accordance with the speech norms of the language, ask and answer questions, maintain a conversation in the Kazakh language in the scope of the research topic, adequately use communication cues, retell the content of what has been read and heard. Be able to: compose and arrange texts, compile a glossary on the topic of research, write the text of an article, read original texts in the Kazakh language in the specialty with and without a dictionary, find the given information, remember the content of what has been read; understand statements in the Kazakh language; - analyze linguistic and stylistic means; - create texts of scientific, journalistic style; - to build utterances-monologues within the framework of the language of the profession and specialty; have practical experience: - using language means in communication; - build a communication strategy to achieve successful communication; - correctly draw up official service and business documentation. Master: - genres of oral speech (conduct a professional conversation, exchange information, conduct a discussion) and written speech (compose official letters, instructions, various documents; edit what is written). - derivational models, contextual meanings of polysemantic words, terms and lexical constructions of the sublanguage.
6. Course author	Sarsembieva E.K.
7 main literature	Russian language: a textbook on the floor scientific style of speech for students of technical specialties / A.Sh. Albekova. - Astana: Kazakh state agro-technical university named after S. Seifullina, 2005.
8. Content of the discipline	Forms of professional vocabulary. The form of the phrase combination. Methods of scientific and technical terms. Semantic termination method. Analytical termination method. About translation. Errors and reasons for translation. ESSAY Writing Basics. Didactic materials (dictionary of the dictionary). List used literature

Basic information about the discipline:	
1.Name of the discipline	Professional Kazakh language
2. Number of credits	**four**
3. Prerequisites:	Kazakh language
4. Post-requisites:	Disciplines teaching in the Kazakh language
5. Competencies:	Know: - lexical and grammatical structure of the Kazakh language; language system and stylistic resources at the lexical and grammatical level; - - language of the specialty (terminological minimum, minimum of speech topics); express themselves in the Kazakh language in accordance with the speech norms of the language, ask and answer questions, maintain a conversation in the Kazakh language in the scope of the research topic, adequately use communication cues, retell the content of what has been read and heard. Be able to: compose and arrange texts, compile a glossary on the research topic, write the text of an article, read original texts in the Kazakh language in the specialty with and without a dictionary, find the given information,

	remember the content of what you read; understand statements in the Kazakh language; - analyze linguistic and stylistic means; - create texts of scientific, journalistic style; - to build utterances-monologues within the framework of the language of the profession and specialty; have practical experience: - using language means in communication; - build a communication strategy to achieve successful communication; - correctly draw up official service and business documentation. Master: - genres of oral speech (conduct a professional conversation, exchange information, conduct a discussion) and written speech (compose official letters, instructions, various documents; edit what is written). - derivational models, contextual meanings of polysemantic words, terms and lexical constructions of the sublanguage.
6. Course author	Sarsembieva E.K.
7. Main literature	"Kazakh tili" onu turaly Astnaa 2008 Sergazina Қ. Zh., Rustemova S.K., Kenzhemuratova S.K.
8. Content of the discipline. Forms of professional vocabulary. The form of the phrase combination. Methods of scientific and technical terms. Semantic termination method. Analytical termination method. About translation. Errors and reasons for translation. ESSAY Writing Basics. Didactic materials (dictionary of the dictionary). List used literature	

Basic information about the discipline:	
1.Name of the discipline	Professionally oriented foreign language
2. Number of credits	**four**
3. Prerequisites:	Foreign language
4. Post-requisites:	Specialized disciplines taught in English
5. Competencies:	Know a foreign language to the extent necessary to obtain professional information from foreign sources and basic communication at a general and professional level; general, business and professional vocabulary of a foreign language in the amount necessary for communication, reading and translation (with a dictionary) of foreign language texts of a professional orientation; basic grammatical structures of literary and colloquial language. – be able to use a foreign language in interpersonal communication and professional activity; freely and adequately express their thoughts in a conversation and understand the speech of the interlocutor in a foreign language; conduct written communication in a foreign language, compose business letters; apply methods and means of cognition for intellectual development, raising the cultural level, professional competence. – have the skills to express their thoughts and opinions in interpersonal, business and professional communication in a foreign language; various skills of speech activity (reading, writing, speaking, listening) in a foreign language language. – be competent in the use of professional terms in English and in the selection of linguistic means in the translation of specialized texts.
6. Course author	Slipchenko S.A.
7. Main literature	1. Educational-methodical complex on "English language" for first-year students of all specialties Rakhimova D.M., Adimzhanova B.E. 2. Professional English. Version 1.0 [Electronic resource]: electron. Training method. Discipline complex. - Krasnoyarsk: IPK SFU, 2008. T.N. Yamskikh, R.A. Korolenko, I.M. Count et al.
8. Content of the discipline. Grammar. Electrical engineering. Professionally oriented texts Grammar. Professionally oriented texts. Grammar. Professionally oriented texts.	

Basic information about the discipline:	
1.Name of the discipline	Mathematics I
2. Number of credits	**five**
3. Prerequisites:	School course Algebra and the beginning of analysis. Geometry

4. Post-requisites:	Mathematics II. Engineering mathematics
5. Competencies:	**Know:** the student must know and understand the basics of the studied mathematics course in the number of hours of the work program. **Be able to:** be able to apply the knowledge gained in practice; be able to independently solve problems with further generalization of the results obtained. **Master:** master the technique of solving various types of computational problems, analyze theoretical data, clearly and clearly convey information, ideas, problems, the future specialist should be free to navigate the information flow and be able to apply the acquired knowledge, skills and abilities in solving applied problems in the relevant spheres of human life; in solving engineering problems, in using the achievements of fundamental science for the successful study of general theoretical and special engineering disciplines, the development of mathematical thinking and logic for use in chemistry, physics, descriptive geometry.
6. Course author	Dyusembaeva L.K.
7. Main literature	1. N.S. Piskunov. Differential and integral calculus. M. 2008.vol. 1, 2. 2. N.V. Efimov. A short course in analytical geometry. M. 2007. 3. V.P. Minorsky. Collection of problems in higher mathematics. M. Science. 2008 4. V.S. Shipachev. Higher mathematics. M. 2001. 5. I.I. Likholetov. Higher mathematics, probability theory and mathematical statistics. Minsk. 2007.

8. Content of the discipline. Determinants of the second and third order, their properties and calculation. Determinants of the nth order. Matrix concept. Types of matrices, operations on matrices. Inverse matrix. Solving systems of linear equations by Cramer's method. Matrix method for solving systems of linear equations. Gauss method. Application of elements of linear algebra in radio engineering. The simplest problems of analytical geometry on a plane. Equations of a straight line on a plane. Vectors. Linear operations on vectors. Scalar, vector and mixed product of vectors. Surface equation. General equation of the plane. Study of the general equation of the plane. Conditions for parallelism and perpendicularity of planes. Equation of a straight line in space. The use of analytical geometry in radio engineering. Functions. Methods for setting a function. Basic elementary functions, their properties and graphics. Function limit. Basic theorems on limits. Infinitesimal and infinitely large quantities. Remarkable limits. Derivative of the function. The geometric and mechanical meaning of the derivative. Derivative table of basic elementary functions. Differential function. Higher order derivatives. Rolle's, Lagrange's, Cauchy's theorems. L'Hôpital's rule. Taylor's formula with a remainder in the Lagrange form. Examining a function using a derivative. Application of elements of differential calculus in radio engineering. Antiderivative. Indefinite integral and its properties. Integral table. Direct integration methods. Integration by change of variables and by parts. Integration of rational, trigonometric and irrational functions. Problems leading to the concept of a definite integral. The definite integral as the limit of integral sums. Infinitely small and infinitely large quantities. Remarkable limits. Derivative of the function. The geometric and mechanical meaning of the derivative. Derivative table of basic elementary functions. Differential function. Higher order derivatives. Rolle's, Lagrange's, Cauchy's theorems. L'Hôpital's rule. Taylor's formula with a remainder in the Lagrange form. Examining a function using a derivative. Application of elements of differential calculus in radio engineering. Antiderivative. Indefinite integral and its properties. Integral table. Direct integration methods. Integration by change of variables and by parts. Integration of rational, trigonometric and irrational functions. Problems leading to the concept of a definite integral. The definite integral as the limit of integral sums. Infinitely small and infinitely large quantities. Remarkable limits. Derivative of the function. The geometric and mechanical meaning of the derivative. Derivative table of basic elementary functions. Differential function. Higher order derivatives. Rolle's, Lagrange's, Cauchy's theorems. L'Hôpital's rule. Taylor's formula with a remainder in the Lagrange form. Examining a function using a derivative. Application of elements of differential calculus in radio engineering. Antiderivative. Indefinite integral and its properties. Integral table. Direct integration methods. Integration by change of variables and by parts. Integration of rational, trigonometric and irrational functions. Problems leading to the concept of a definite integral. The definite integral as the limit of integral sums. Derivative of the function. The geometric and mechanical meaning of the derivative. Derivative table of basic elementary functions. Differential function. Higher order derivatives. Rolle's, Lagrange's, Cauchy's theorems. L'Hôpital's rule. Taylor's formula with a remainder in the Lagrange form. Examining a function using a derivative. Application of elements of differential calculus in radio engineering. Antiderivative. Indefinite integral and its properties. Integral table. Direct integration methods. Integration by change of variables and by parts. Integration of rational, trigonometric and irrational functions. Problems leading to the concept of a definite integral. The definite integral as the limit of integral sums. Derivative of the function. The geometric and mechanical meaning of the derivative. Derivative table of basic elementary functions. Differential function. Higher order derivatives. Rolle's, Lagrange's, Cauchy's theorems. L'Hôpital's rule. Taylor's formula with a remainder in the Lagrange form. Examining a function using a derivative. Application of elements of differential calculus in radio engineering. Antiderivative. Indefinite integral and its properties. Integral table. Direct integration methods. Integration by change of variables and by parts. Integration of rational, trigonometric and irrational functions. Problems leading to the concept of a definite integral. The definite integral as the limit of integral sums. Differential function. Higher order derivatives. Rolle's, Lagrange's, Cauchy's theorems. L'Hôpital's rule. Taylor's formula with a remainder in the Lagrange form. Examining a function using a derivative. Application of

elements of differential calculus in radio engineering. Antiderivative. Indefinite integral and its properties. Integral table. Direct integration methods. Integration by change of variables and by parts. Integration of rational, trigonometric and irrational functions. Problems leading to the concept of a definite integral. The definite integral as the limit of integral sums. Differential function. Higher order derivatives. Rolle's, Lagrange's, Cauchy's theorems. L'Hôpital's rule. Taylor's formula with a remainder in the Lagrange form. Examining a function using a derivative. Application of elements of differential calculus in radio engineering. Antiderivative. Indefinite integral and its properties. Integral table. Direct integration methods. Integration by change of variables and by parts. Integration of rational, trigonometric and irrational functions. Problems leading to the concept of a definite integral. The definite integral as the limit of integral sums. Antiderivative. Indefinite integral and its properties. Integral table. Direct integration methods. Integration by change of variables and by parts. Integration of rational, trigonometric and irrational functions. Problems leading to the concept of a definite integral. The definite integral as the limit of integral sums. Antiderivative. Indefinite integral and its properties. Integral table. Direct integration methods. Integration by change of variables and by parts. Integration of rational, trigonometric and irrational functions. Problems leading to the concept of a definite integral. The definite integral as the limit of integral sums.
Basic properties of a definite integral. Newton-Leibniz formula Improper integrals. Applications of a definite integral to the solution of problems in radio engineering.

Basic information about the discipline:	
1. Name of the discipline	Physics
2. Number of credits	**four**
3. Prerequisites:	School base of natural sciences
4. Post-requisites:	Basic disciplines
5. Competencies:	know: - the basic laws of classical and modern physics and physical phenomena; - methods of physical research; have an idea of: - the limits of applicability of various physical concepts, phenomena of laws and theories to solving technical problems; be able to: - use modern physical phenomena and laws in practice and interpret the results of a physical experiment; have practical skills: - solving specific problems of physics; - carrying out a physical experiment and evaluating the results obtained; be competent in problem setting and physical interpretation of laws and phenomena.
6. Course author	Murzalinov D.O.
7. Main literature	one. Tyurin Yu.I., Chernov I.P., Kryuchkov Yu.Yu. Physics part 2. Electricity and Magnetism: A Textbook for Technical Universities. - Tomsk: Publishing house

	Tomsk University, 2003 .-- 738 p. 2. Saveliev I.V. General Physics Course: Textbook. In 3 vols. Vol.2: Electricity and magnetism. Waves. Optics. 7th ed., Erased. - SPb .: Publishing house "Lan", 2007. - 496 p .: 3. Detlaf A.A., Yavorsky B.M. Physics course: textbook for technical colleges. - 4th ed., Rev. - M .: Higher. shk., 2002 .-- 718 p. 4. Trofimova T.I. Physics course: textbook. manual for universities. - Ed. 9th, revised and add. - M .: Publishing Center "Academy", 2004. - 560 p. 5. Irodov I.E .: Electromagnetism. Basic laws. - 5th edition –M .: BINOMIAL. Knowledge Laboratory, 2006 - 319 p.
8. Content of the discipline. The laws of physics. Fundamental sections of physics, incl. physical foundations of mechanics, molecular physics and thermodynamics, electricity and magnetism, optics, atomic and nuclear physics.	

Basic information about the discipline:	
1. Name of the discipline	Mathematics II
2. Number of credits	**four**
3. Prerequisites:	Mathematics I
4. Post-requisites:	Engineering mathematics
5. Competencies:	Know and understand: the student must know and understand the basics of the mathematician course being studied and in the number of hours of the work program. Be able to: be able to apply the acquired knowledge in practice; be able to independently solve problems with further generalization of the results obtained. Possess the skills: master the technique of solving various types of computational problems, analyze theoretical data, clearly and clearly convey information, ideas, problems, the future specialist should be free to navigate the information flow and be able to apply the acquired knowledge, skills and abilities in solving applied problems in the relevant human spheres' life activity. in solving engineering problems, in using the achievements of fundamental science for the successful study of general theoretical and special engineering disciplines, the development of mathematical thinking and logic for application in chemistry, physics, descriptive geometry.
6. Course author	Dyusembaeva L.K.
7. Main literature	1. N.S. Piskunov. Differential and integral calculus. M. 2008. vol. 1, 2. 2. N.V. Efimov. A short course in analytical geometry. M. 2007. 3. V.P. Minorsky. Collection of problems in higher mathematics. M. Science. 2008 4. V.S. Shipachev. Higher mathematics. M. 2001. 5. I.I. Likholetov. The highest mathematics, theory probabilities andmath statistics. Minsk. 2007. 6. N.N. Privalov. Analytic geometry. M. 1964. 7. A.A. Gusak Higher mathematics. Textbook. Minsk. Vol. 1.2. 2003, 2004. 8. A.A. Gusak. Problems and exercises in higher mathematics. Minsk. vol. 1.2. 2008.
8. Content of the discipline. Functions of several variables, scope. Function limit. Continuity. Partial derivatives. Full differential. Differentiation of implicit functions. Extremum of a function of two variables. Finding the largest and smallest value of a function in a given area. Application of the theory of extrema to the solution of problems in radio engineering. Problems leading to the concept of differential equations. Differential equations of the first order. The theorem on the existence and uniqueness of the solution to the Cauchy problem. Differential equations of higher orders. Equations admitting lowering of order. Application to solving problems of radio engineering. Linear differential equations, homogeneous and inhomogeneous. General solution concept. Linear differential equations with constant coefficients. Method of variation of arbitrary constants. Application of differential equations in solving problems of radio engineering. Number series. Convergence and sum of a series. Necessary condition for convergence. Sufficient conditions for the convergence of positive series. Alternating rows. Leibniz's theorem. Absolute and conditional convergence. Functional rows. Convergence region. Power series. Abel's theorem. Convergence radius. Expansion of functions in power series. Taylor series. Fourier series. Expanding functions in a series Fourier.	

Basic information about the discipline:	
1.Name of the discipline	Mathematical problems in the electric power industry
2. Number of credits	**four**
3. Prerequisites:	The highest mathematics, computer science, physics, theoretical basics electrical engineering 1
4. Post-requisites:	Knowledge and skills acquired in the study of this discipline, required for coursework and diploma design
5. Competencies:	The purpose of teaching the discipline is to connect mathematics as a general theoretical course with its practical application in the work of a specialist in the field of electric power and to provide a specific mathematical apparatus for applied research. Objectives of studying the discipline: - to prepare students for the perception of mathematical issues in special courses and the use of mathematical methods in solving various energy problems; - master modern optimization methods; - acquire the skills of setting a problem and developing mathematical models. As a result of training, the student must know and understand: - fundamentals of mathematical modeling; - methods for solving optimization problems in the energy sector; - methods holding computing experiments for adopting sound economic and technical solutions; - methods of statistical processing of experimental and statistical data. After endings studying discipline, learners should be able to apply theoretical knowledge in practice, in particular: - make up probabilistic-statistical and optimization model energy processes; - determine the optimal parameters of power supply systems; - apply software packages to solve optimization and statistical problems; - evaluate the optimality of the applied solutions; - apply approximate methods to solve nonlinear programming problems. Students must be proficient in: - modern methods and means of solving electric power problems; - optimization processes in power supply systems; - technical justification optimization and modeling in electric power industry. Students must acquire practical skills: - calculations for optimization of parameters and modes of electric power systems; - analysis and of choice directions solutions mathematical tasks electric power industry; - calculations and proof of the solution of mathematical problems of the electric power industry.
6. Course author	Baiguzova Zh.Zh.
7. Main literature	1. Kalinina V.N., Pankin V.F. Math statistics. - M .: Bustard, 2002. 2. Medvedev SN, Course of lectures "Mathematical problems in power engineering". - P .: PSU, 2005. 3. Economic and mathematical methods and applied models: Textbook for universities / Ed. V.V. Fedoseev. - M .: UNITY-DANA, 2005. 4. Gamazin S.I., Cherepanov V.V. Application of matrix algebra and probability theory to solving power supply problems: Textbook. - Gorky: Ed. Gorky State University. - 1990. 5. Venikov V.A., Zhuravlev V.G., Filippova T.A. Optimizing modes power plants and power systems: Textbook for universities. - M.: Energoatomizdat, 1990.
8. Content of the discipline. The course "Mathematical Problems in Electric Power Engineering" is an elective basic subject for bachelors studying in the specialty "Electric Power Engineering". This course is based on courses in physics and mathematics. The widespread use of personal computers in the analysis and modeling of electrical circuits makes it necessary, while studying this course, to know the basics of computer science. Module 1 - Modeling: Steady State Equations; analytical presentation of the configuration of electrical networks; solving problems of calculating electrical networks in matrix form; methods for solving equations	

steady state.
Module 2 - Mathematical programming: mathematical foundations of optimization of parameters and modes of electrical networks; solving linear programming problems; setting a transport task in the field of electric power industry; nonlinear and dynamic programming.
Module 3 - Criteria analysis: the main tasks of criterion analysis in the electric power industry; study of the technical and economic model of power lines; mathematical foundations of system stability; algebraic stability criteria.
Module 4 - Application of the theory of probability in the electric power industry: random events; conditional probability; random variables; numerical characteristics of random variables; mathematical models of failures and restorations; determination of the laws of distribution of random variables.

Basic information about the discipline:	
1.Name of the discipline	Converter technology in the power industry
2. Number of credits	**five**
3. Prerequisites:	Mathematics. Physics. Theoretical foundations of electrical engineering-1.2. Theory automatic control. Electrical materials. Industrial electronics. Automatic control theory. Electrical measurements
4. Post-requisites:	Automated electric drive. Electric cars. Relay protection and automation of electric power systems. The knowledge gained by mastering the discipline is necessary when performing a bachelor's final qualifying work, studying the disciplines of a specialty, as well as when professional practice.
5. Competencies:	Students should have an idea of modern and promising directions in the development of power conversion technology. know and understand the laws of electrical engineering; principle of operation and design features of electronic devices; types of power converting devices, their brief characteristics and purpose; physical phenomena occurring in the electrical circuits of the SPU; fundamentals of the theory of electrical transformation fields; methods analysis but and calculation converters innormal and emergency modes; ways of constructing electrical circuits of power converters; principles of operation of converting devices. To be able to independently choose converter circuits, calculate the main elements (diodes, transistors, thyristors) of converting equipment, analyze electromagnetic processes, develop circuits for the converter control system, read the drawings of the electrical connection diagrams of converters. Acquisition of skills in solving issues of application, adjustment, selection of basic operating modes, operation and improvement of power converting equipment used in industrial enterprises; the ability to analyze the operation of electronic devices; discussion skills and vocabulary terminology; possess information about the technical parameters of equipment for use when designing electronic devices; skills in the use of information in the design of power electronics.
6. Course author	Leznaya O.N.
7. Main literature	1. Zinoviev G.S. Fundamentals of Power Electronics: Textbook. manual.- Ed. 3rd, rev. and additional - Novosibirsk: Publishing house of NSTU, 2004.-672s. 2. Zinoviev G.S. Fundamentals of power electronics: Textbook. - Novosibirsk: Publishing house of NSTU, 1999. Part 1 - 199s. 3. Zinoviev G.S. Fundamentals of power electronics: Textbook - Novosibirsk: Publishing house of NSTU, 2000. Part 2 - 197p. 4. Power converting equipment and power supplies of electrotechnical installations: Textbook / V.N. Mukazhanov, S.V. Kon'shin: AIPET. Almaty, 1999.- 80s. 5. Yu.K. Rozanov Fundamentals of power converting technology - M .: Energiya, 1979.- 392 p. 6. Bobrovnikov L.Z. Electronics: Textbook for universities. - SPb .: Peter, 2004 .-- 560 p.
8. Content of the discipline. Classification of controlled converters electrical energy. Single-phase controlled rectifiers. Straightening three-phase current. Features of rectifier operation for capacitive load and back-EMF. External characteristics rectifiers. Filters. Grid-driven inverters. Characteristics and modes of their operation (single-phase inverter	

with a midpoint; three-phase bridge inverter). Autonomous inverters. Frequency converters. Thyristor voltage regulators (TRN). Power supplies with ballast resistances (active, inductive, capacitive). Parametric power supplies. Closed loop power supplies.

Basic information about the discipline:	
1.Name of the discipline	Basics of Automation
2. Number of credits	**five**
3. Prerequisites:	Theoretical Foundations of Electrical Engineering, Theory of Automatic Control, Electrical cars, Theory electrical devices, Automated electric drive.
4. Post-requisites:	The knowledge and skills acquired in the study of this discipline are necessary in the study of the following disciplines: Electrotechnology in agriculture and writing a thesis
5. Competencies:	The ability to collect and analyze initial information data for the design of technological processes for the manufacture of products, means and systems for automation control, technological equipment, diagnostics, testing, process management, product life cycle and quality.
6. Course author	Akhmetova S.O.
7. Main literature	1Borodin I.F., Sudnik Yu. A. Automation of technological processes. M .: Kolos. 2003 2 Borodin IF, Nedilko NM Automation of technological processes. M .: Agropromizdat, 2006 3 Klyuev A.S., Glazov B.V., Dubrovsky A.Kh., Klyuev A.A. "Design of automation systems for technological processes" (reference manual) M .: Energopromizdat 2000. 4 F. Ya. Izakov et al. "Course and diploma design for the automation of technological processes" M .: Agropromizdat 2008
8. Content of the discipline. Automation contributes to an unlimited increase in labor productivity, improvement of working conditions for people, and the convergence of physical and mental labor. In other words, automation is the state of the art of a new, most progressive society. Thus, complex automation of the preparation of feed on production lines provides a decrease in labor costs by 4 ... 5 times and a decrease in the cost of preparing feed by 30 ... 50%. Fundamentally new automated control systems for process control systems. ACS, etc., into the structure of which control computers (CFM) are introduced. Due to the functioning of the UVM, such systems manage technological processes and production as a whole in optimal modes and make it possible to significantly reduce labor costs and at the same time increase the quantity and improve the quality of products.	

Basic information about the discipline:	
1.Name of the discipline	Isolation and overvoltage
2. Number of credits	**four**
3. Prerequisites:	Mathematics. Physics. Theoretical foundations of electrical engineering-1.2. Automatic theory management. Electrotechnical materials. Electrotechnological installations of industrial enterprises.
4. Post-requisites:	The knowledge gained by mastering the discipline is necessary when performing bachelor's final qualifying work and the study of disciplines of the specialty.
5. Competencies:	- have an idea of high voltage electrical installations, the operation of external and internal insulation and the principles of insulation design, protection against overvoltage; –Know and understand (descriptor A): the main mechanisms of breakdown of various dielectrics; methods of monitoring the state of insulation of high-voltage equipment; the physical nature of the occurrence of overvoltage and how to protect against them. - be able to (descriptor B): use the knowledge gained in mastering the educational material of subsequent disciplines. Experimentally determine the parameters of high-voltage electrical discharge installations, choose the optimal conditions for the reliable functioning of insulation electrical equipment, to conduct experiments with half-way processing and analysis of results in the field of electrical power.

	-to master (descriptor C, D, E): experience in using the basic methods of organizing self-study and self-control. -to acquire practical skills (descriptor C, D, E): application of methods for calculating overvoltage in linear and nonlinear electrical circuits. Possess the skills of working with reference literature and regulatory technical materials.
6. Course author	Leznaya O.N.
7. Main literature	1. Borisov V.N. High voltage technique. Overvoltage and isolation: Textbook / V.N. Borisov; Ministry of Education and Science of the Republic of Kazakhstan: AIPET.-Almaty: AIPET, 2006.-74 p. 2. Borisov V.N. High voltage technique. Overvoltage and isolation: Textbook / V.N. Borisov; Ministry of Education and Science of the Republic of Kazakhstan: AIPET.-Almaty: AIPET, 2006.-74 p. 3. V.P. Larionov High voltage technology (insulation and overvoltage in electrical installations): Textbook / V.P. Larionov, V.V.Bazutkin, Yu.G. Sergeev; Ed. V.P. Larionov. - M .: Energoizdat, 1982. -296s 4. Bazutkin V.V. and others. Technique of high voltages: Isolation and overvoltage in electrical systems: Textbook for universities / VV Bazutkin, VP Larionov, Yu.S. Pintal; Under total. Ed. V.P. Larionov. - 3- ed., rev. and additional - M .: Energoatomizdat, 1986.-463 p.
8. Content of the discipline. 1. General characteristics of the external insulation of electrical installations. 2. Characteristics of the corona on DC and AC lines. Energy losses for the corona, ways to reduce the losses for the corona. 3. The principles of building internal insulation. 4. General characteristic of internal overvoltage. 5. Thunderstorm overvoltage and lightning protection of electrical installations. Internal overvoltage in electrical systems with long transmission lines. 6. Characteristic of switching overvoltage. Overvoltage when disconnecting capacitors and unloaded lines. 7. Coordination of isolation.	

Basic information about the discipline:	
1.Name of the discipline	Study practice
2. Number of credits	**one**
3. Prerequisites:	
4. Post-requisites:	Industrial practice, pre-diploma practice
5. Competencies:	Have the skills to independently perform practical work, collect and analyze the necessary material. Gaining experience in execution main production processes at the facilities of the department or enterprise.
6. Course author	Tatkeeva G.G.
7. Main literature	Professional Practice Program.
8. Content of the discipline. Safety briefing. Practice in research institutes, at the department may consist in acquaintance with: the most significant scientific results of the research institute's work, with methods of interpreting the results obtained, with unique experimental radio-electronic systems and complexes of this research institute, with software environments used in computer modeling, with processing technology information, with other questions (in the specialty). Practice at an enterprise, in an organization can be an acquaintance: with the production tasks of the enterprise, with methods of solving them, with instruments, equipment, electronic systems and complexes used or manufactured at the enterprise, with production automation systems, with information technologies used in the organization, with the solution of information security problems, with other areas of the enterprise (within the specialty).	

Basic information about the discipline:	
1.Name of the discipline	Internship
2. Number of credits	**eighteen**
3. Prerequisites:	Educational practice. Final examination.
4. Post-requisites:	Undergraduate practice.
5. Competencies:	– know - features labor activities by specialties "Electric Power Engineering"; – be able to - navigate the problems solved in the field of electric power; – master - ideas about the directions of possible application of their future professional knowledge.
6. Course author	Tatkeeva G.G.
7. Main literature	Professional Practice Program.

8. Content of the discipline. Preparatory stage. Introductory stage. Safety briefing. Work briefing, safety studies and on-the-job training. Acquaintance with the enterprise and its energy saving and automation system. Production stage. Execution of production assignments. Study of theoretical material. Independent work with literature and technical documentation. Collection, processing, systematization and analysis of factual and literary material. The final stage.

1. Basic information about the discipline:	
Name of the discipline	Electrical materials
2. Number of credits	**3**
3. Prerequisites:	For the successful development of the course "Electrical Materials Science" knowledge of physics, chemistry, theoretical foundations of electrical engineering is required.
4. Post-requisites:	The knowledge and skills acquired by students in the course of studying this course will be applied in the future in the study of disciplines: electrical machines, power plants and substations, electrical systems and networks, repair of electrical equipment, operation of electrical equipment.
5. Competencies:	- know and understand: the structure and properties of electrical materials, materials; areas of application of materials; classification and labeling of basic materials; methods of corrosion protection; methods of processing materials. - The student should be able to: correctly assess the appropriateness of the choice and use of electrical materials, work on laboratory equipment; - The student must know: the classification of modern electrical materials, their behavior in an electromagnetic field and under the influence of various factors, the properties of materials, their application, the test methodology and determination of the main characteristics of the most common electrical materials.
6. Course author	Gerasimenko T.S.
7. Main literature	1. Bogoroditsky N.P., Pasynkov V.V., Tareev B.M. Electrotechnical materials - L .: Energoatomizdat, 1985.304 p. 2. Koritsky Yu.V. Electrical materials. –L. : Energoatoizdat, 1985. - 319p. 3. Antipov B.L., Sorokin V.S., Terekhov V.A. Electronic engineering materials. Tasks and questions. - M .: Higher school, 1990 .-- 208 p. 4. Bekmagambetova K.M. Electrical engineering materials science. Lecture notes, 2006
8. Content of the discipline	The components of the discipline are the following sections: dielectric materials, conductive materials, semiconductor materials, magnetic materials. The discipline studies the basic physical phenomena occurring in materials when exposed to electromagnetic fields, properties of materials, production technology, application in electrical engineering.

1. Basic information about the discipline:	
Name of the discipline	Theoretical Foundations of Electrical Engineering I
2. Number of credits	**eight**
3. Prerequisites:	Mathematics I, Mathematics II, Physics I, Physics II, Informatics
4. Post-requisites:	Electrical Machines, Theoretical Foundations of Electrical Engineering I, power supply and other specialized disciplines
5. Competencies:	- to know and understand (descriptor A): to independently calculate the parameters of the operation of various types of protection, build selectivity maps, analyze the actions of protections and automation in various modes of the system, choose circuit solutions for their implementation; - be able to (descriptor B): acquisition and application of practical skills in the design of protection equipment and automation of electric power systems; - master, acquire practical skills (descriptor C, D, E): the ability to compare, analyze the operation of protection and automation devices in

	different modes of operation of the electric power system, draw conclusions based on the results of the analysis.
6. Course author	Alpeisov E.A.
7. Main literature	Tuganbaeva I.T., Gorbunov A.N. and others - Theoretical foundations of electrical engineering., Almaty, 2012
8. Content of the discipline	1. Linear DC electric circuits. 2. Methods of calculation. 3. Two-terminal networks. 4. Electric circuits of single-phase sinusoidal current. 5.Three-phase chains. Symmetrical and asymmetrical modes. 6. Non-sinusoidal currents. Calculation of circuits with non-sinusoidal circuits. Resonance at non-sinusodal currents.

1. Basic information about the discipline:	
Name of the discipline	Theoretical Foundations of Electrical Engineering II
2. Number of credits	**6**
3. Prerequisites:	Mathematics I, Mathematics II, Physics I, Physics II, Informatics
4. Post-requisites:	Electrical Machines, Theoretical Foundations of Electrical Engineering II, power supply and other specialized disciplines
5. Competencies:	- to know and understand (descriptor A): to independently calculate the parameters of the operation of various types of protection, build selectivity maps, analyze the actions of protections and automation in various modes of the system, choose circuit solutions for their implementation; - be able to (descriptor B): acquisition and application of practical skills in the design of protection equipment and automation of electric power systems; - master, acquire practical skills (descriptor C, D, E): the ability to compare, analyze the operation of protection and automation devices in different modes of operation of the electric power system, draw conclusions based on the results of the analysis.
6. Course author	Alpeisov E.A.
7. Main literature	Tuganbaeva I.T., Gorbunov A.N. and others - Theoretical foundations of electrical engineering., Almaty, 2012
8. Content of the discipline	The course "Theoretical Foundations of Electrical Engineering 2" (TOE2) is the basis for all subsequent electrical engineering disciplines. The course takes the main place among the general technical disciplines that determine the theoretical level of professional training of bachelors of electrical power engineering. Contains a general theory of circuits and electromagnetic fields and engineering methods for their calculation, analysis and synthesis. It is of exceptional importance for the formation of the scientific outlook of specialists in the electric power industry, and for all electrical disciplines are based on it.

1. Basic information about the discipline:	
Name of the discipline	Electrical measurements
2. Number of credits	**five**
3. Prerequisites:	The material of the discipline is based on the knowledge and skills (competencies) obtained in the study of disciplines: physics, mathematics, information and communication technologies (computer science), electrical drawings, theoretical foundations of electrical engineering - 1.
4. Post-requisites:	The knowledge and skills (competencies) obtained after studying the discipline are necessary for studying the disciplines of the professional module (PD) of various MOPs in the specialty, in particular: power plants and substations, power grids and systems, transients in the power industry, relay protection and automation of power systems, design of power supply systems. Also, the acquired competencies in the discipline are necessary when performing final qualifying work of a bachelor (VKRB) and in the practical activities of a graduate.

5. Competencies:	– Know: basic concepts of measurements and units of physical quantities; main types of measuring instruments and their classification; the main methods of measuring the parameters of electrical circuits, as well as the foundations of the construction and operation of electrical measuring instruments. – Be able to: apply the basic methods and principles of measurements; choose means of electrical measurements; measure electrical

	magnitudes; determine the value of the measured value and the measurement accuracy indicators; use computer facilities for processing and analyzing measurement results. – Master: skills in using basic physical and mathematical laws and principles in the field of electrical measurements; methods of correct operation of the main instruments and equipment of a modern technical laboratory; processing and interpretation methods the results of the experiment.
6. Course author	Rozhkov V.I.
7. Main literature	1. Metrology, standardization, certification and electrical measurement technology : textbook. manual for universities / KK Kim [and others]: ed. K. K. Kim, p. (stamp UMO). 2. Thermal measurements and devices: textbook. for universities in the direction of "Heat power engineering" / G. M. Ivanova, N. D. Kuznetsov, V. S. Chistyakov. - 2nd ed., Rev. and add. - M.: Publishing house of MEI, p. (stamp UMO). 3. Radkevich, Yakov Mikhailovich. Metrology, standardization and certification [Electronic resource]: textbook. for bachelors / Ya.M. Radkevich, A.G. Skhirtladze, 2012 (EBS)
8. Content of the discipline	1. Introduction to the discipline. 2. Modern metrology. 3. Measurement process. 4. Measurement error. 5. Processing and presentation of the measurement result. 6. Measuring instruments for static measurements. 7. Measuring instruments for dynamic measurements. 8-10. Analog measurements of basic, derived electrical quantities. 11. Digital measurements: computer measurement methodology. 12. Digital measurements of electrical quantities. 13. Digital registration of measurements. 14. Information-measuring systems and complexes. 15. Automation measurements.

Basic information about the discipline:	
1.Name of the discipline	Industrial electronics
2. Number of credits	**four**
3. Prerequisites:	Mathematics. Physics. Theoretical fundamentals of electrical engineering-1
4. Post-requisites:	The knowledge gained by mastering the discipline is necessary when performing the bachelor's final qualifying work and studying the disciplines of the specialty.
5. Competencies:	– have an idea of modern and promising trends in the development of electronics; on the field of application of various electronic devices. – know and understand (descriptor A): The laws of electrical engineering; principle of operation and design features of electronic devices; physical phenomena occurring in electronic devices; the main characteristics of electronic devices. – be able to (descriptor B): experimentally determine the parameters and characteristics of electronic devices and devices; to measure electrical quantities in semiconductor devices; make a preliminary calculation of the parameters and the selection of the main elements of the electronic circuit. – master, acquire practical skills (descriptor C, D, E): the ability to analyze the operation of electronic devices; discussion skills and vocabulary terminology; possess information about the technical parameters of equipment for use in the design of electronic devices; information application skills when designing power electronics.
6. Course author	Leznaya O.N.
7. Main literature	1. Gusev V.G., Gusev Yu.M. Electronicsand microprocessor technology: Textbook for universities - M .: Higher. shk., 2006, - 799 p. 2. Bulychev A.L., Lyamin E.S., Tulinov E.S. Electronic devices. –M .: Light Ltd. 2000, - 416 p. 3. Lachin V.I., Savelov N.S. Electronics: Textbook. manual-Rostov n / a: Phoenix, 2005.-704 p. 4. Reg J. Industrial electronics: [textbook] -M .: DMK-Press, 2011.- translated from English. 1137s.
8. Content of the discipline... 1. Semiconductor devices with one pn junction.	

2. Transistors (bipolar, field, IGBT). 3. Switching devices (dinistor, trinistor, triac). 4. Optoelectronic devices (photoresistance, photodiode, light-emitting diode, optocoupler). 5. Amplifying cascades of electrical signals. 6. Integrated circuits. 7. Secondary power supplies. 8. Pulse operation of semiconductor devices

1. Basic information about the discipline:	
Name of the discipline	Electro-technological installations of industrial enterprises
2. Number of credits	**five**
3. Prerequisites:	Mathematics. Physics. Theoretical foundations of electrical engineering-1.2. Theory automatic control. Electrical materials.
4. Post-requisites:	The knowledge gained by mastering the discipline is necessary when performing bachelor's final qualifying work, the study of disciplines of the specialty, as well as in professional practice.
5. Competencies:	– have an idea of modern and promising design directions electrotechnical installations systems power supply; about the features of the application of various EGS. – know and understand (descriptor A): main sources of scientific and technical information on electrotechnological processes and electrotechnological equipment; materials used in the construction of electrical installations, their classification; the purpose of various ETU SES, their area of application, design, principle of operation, main technical parameters; measures of labor protection and environmental safety during the operation of electrical installations. – be able to (descriptor B): search and analyze scientific and technical information about computer and microprocessor tools and select the necessary information materials; use software tools for calculating and modeling electrical technological processes; choose the types of electrical installations for the implementation of various technological processes, based on technological, economic, energy and environmental indicators. – master, acquire practical skills (descriptor C, D, E): master the experience of using major methods organization self-study and self-control; master the skills of discussion on professional topics; know the terminology in the field of electrotechnological processes and installations; master the skills of c a l c u l a t i o n and d e s i g n i n g electrotechnical installations; to acquire practical skills in applying the information obtained in the design of electrical engineering installations. master the skills of working with reference literature and normative and technical materials.
6. Course author	O. V. Lesnaya
7. Main literature	1. Special issues of electrical technology: Textbook for universities / BB Utegulov, IV Zakharov, AD Izhikova; Ed. B.B. Utegulova. - Pavlodar: NPF EKO LLP, 2009.- 326 p. 2. Induction heating installations: Textbook for universities / A.E. Slukhotsky, V.S. Nemkov, N.A. Pavlov, A.V. Bamuner; Ed. A.E. Slukhotskiy.-L .: Energoizdat, 1981.- 328 p. 3.Bolotov A.V., Shepel G.A. Electrotechnological installations: Textbook. For universities on specials. “Power supply for industrial enterprises ". M .: Higher school, 1998.-336 p. 4.Kuvaldin A.B. The theory of induction and dielectric heating: Textbook. - M .: Publishing house MEI, 1999.-80 p. 5. Rubtsov V.P., Batov N.G. Electrotechnological installations for special purposes: Textbook.- M .: Publishing house MEI, 2006.-64 p.

8. Content of the discipline. 1. Classification of electrical installations. (materials of electrical installations of SES. Specificity of work of structural materials in electrical installations. Refractory, heat-resistant structural materials and requirements for them). 2. Power supply for electrical installations. Electricity transmission to the consumer (categories of receivers according to the reliability of power supply; elements of electrical equipment. Safety in electrical installations and various electrical installations.
3. Electric resistance furnaces (designs of electric resistance furnaces; EPS heat transfer. EPS power supply). 4. Classification, applications and technical and economic characteristics of induction and dielectric heating installations. 5. Electrolysis installations. Electrochemical processes (electrolysis). 6. Electron-ion technology (deposition in an electric field; artificial ionization and calculation of ionizers. Application of ultrasound. Purpose, device and principles of operation of industrial electrostatic precipitators). 7. Installations of special types of electric heating (purpose, designs and power sources of vacuum arc furnaces. Laser technological installations. Electron-beam technological installations.

1. Basic information about the discipline:	
Name of the discipline	Automated power supply control systems
2. Number of credits	**four**
3. Prerequisites:	physics, mathematics, information and communication technologies,electrotechnical blueprints, information-measuring Technics, mathematical problems and computer modeling
4. Post-requisites:	Design of power supply systems, Relay protection and automation EES, as well as the implementation of diploma design and production activities of the graduate
5. Competencies:	After completing the study of the discipline, the student must have an idea of the structure of automated control systems (ACS) and the principles of organizing ACS by technological processes (TP) of electrical installations; about the design features of the elements and the principles of their functioning as part of local automatic control systems (ACS); about typical ACS TP of power supply systems; know and understand (descriptor A): the hierarchy of the APCS and the requirements for its organization (NTD); professional terminology (glossary) in the field of automation and automation of control objects (OU); design and principle of operation of ACS elements, including a programmable logic controller (PLC); rules for reading and constructing automation schemes (SA) of typical technological processes of electrical installations; be able to (descriptor B): analyze the initial data in the organization and operation of the automated process control system for electrical installations; configure (programming) the industrial controller for its intended purpose; read and draw up an automation diagram (CA) of a typical TP, including an algorithm for its functioning; possess practical skills (descriptor C, D, E): discussions on professional topics using terminology in the field of automation and automation; installation of a CA using a PLC; selection and programming of intelligent electronic devices (IED) in the organization and operation of the process control system of electrical installations discussions on professional topics using terminology in the field of automation and automation; installation of a CA using a PLC; selection and programming of intelligent electronic devices (IED) in the organization and operation of the process control system of electrical installations discussions on professional topics using terminology in the field of automation and automation; installation of a CA using a PLC; selection and programming of intelligent electronic devices (IED) in the organization and operation of the process control system of electrical installations
6. Course author	Rozhkov V.I.

7. Main literature	1. Trofimov A.V., Polyakov A.M. Fundamentals of the organization of microprocessor-based automated control systems for technological processes of electrical installations; tutorial. - M .: Publishing house MEI, 2015. 2. Denisenko V.V. Computer control of technological process, experiment, equipment. - M .: Hotline - Telecom, 2009. 3. Barashko O.G. Automation, automation and automated control systems: a course of lectures. - Minsk: BSTU Publishing House, 2011. 4. Belyaev A.V., Royak M.Sh. Automated power supply control systems based on digital relay protection and automation terminals. - M .: NTF "Energoprogress", 2015. 5. Shabad M.A. Automation of electrical distribution networks using digital relays. - M .: NTF "Energoprogress", 2003. 6. Programmable controllers: a manual for an engineer / E. Parr. - M .: BINOM. Knowledge laboratory, 2007. 7. Chichev S.I., Kalinin V.F., Glinkin E.I. Monitoring and control system for electrical equipment of substations. M .: Publishing House "Spectrum", 2011.

	8. IEC 61850-6-2009 (GOST). Communication networks and systems at substations. Part 6. Configuration Description Language for Communication between IEDs 9. LOGO! Operation manual: A5У00119092.02, version 04. SIMENS. SIMATIC. - www.siemens.com/logo.pdf
8. Content of the discipline. The discipline provides for the study of material in three modules: module 1 "Fundamentals of the organization of APCS", which is aimed at mastering the hierarchy of building typical automatic control systems as part of the APCS of electrical installations of power supply systems (SES), as well as studying professional terminology in the field of automation and automation of TP electrical installations of SES on the basis of regulatory and technical documents (NTD); module 2 "Technical means of local automatic control system automation", which is aimed at mastering the design features of the local automatic control system elements and the principles of their operation, including PLC in the implementation of the main tasks of the automatic control system of electrical installations: starting and stopping machines, measuring and signaling, regulation and protection; module 3 "Typical solutions of APCS for electrical installations of SES", which is aimed at mastering the features of the implementation of the main tasks of APCS in various nodes of connection (by voltage) of electrical installations during their operation by consolidating reading skills and building automation schemes and programming requirements for MP IED.	

1. Basic information about the discipline:	
Name of the discipline	Safety in power plants
2. Number of credits	**6**
3. Prerequisites:	The material of the discipline "Fundamentals of safety in electrical installations" is based on the knowledge gained in the disciplines: theoretical foundations of electrical engineering and professional disciplines: power supply, power stations and substations, high voltage technology.
4. Post-requisites:	Knowledge and skills acquired in the study of this discipline, are necessary for course and diploma design, as well as in the process of production activities
5. Competencies:	- know and understand (descriptor A): know and understand situations in which situations there is a danger of electric shock, choose safety measures of a technical and organizational plan, perform calculations for the choice of electrical safety equipment; - be able to (descriptor B): the acquisition and application of practical skills in the design of means of protection against electric shock in various electrical installations; - master to acquire practical skills (descriptor C, D, E): the ability analyze the risk of electric shock in various electrical installations and apply technical and organizational safety measures.
6. Course author	Anisimov Yu.V.
7. Main literature	1 Safety regulations for the operation of electrical installations RK RD 34.03.202.- 04. Almaty, 2008 2 Dolin P.A. Fundamentals of safety in electrical installations. - M .: Energoatomizdat. 1984 .-- 400s 3 Sipkin Yu.D., Sipkin M.Yu. Electrical safety in the operation of electrical installations of industrial enterprises. M .: Publishing Center "Academy". 2004.- 240s. 4 Methodical recommendations for testing electrical equipment and electrical apparatus, Moscow Energoservice, 2003 5 Rules for the construction of electrical installations of the Republic of Kazakhstan. - Astana: 2008. - 592 6 Dolin P.A. Safety handbook. M .: Energoatomizdat, 1987 7 Directory electrical protection funds and safetydevices. - M .: Energoatomizdat, 1984 8 KhomyakovA.M. Funds protection working, applied inelectrical installations. - M .: Energoatomizdat, 1981 10 Kostruba S.L. Measurement of parameters of the earth and grounding devices. - M .: Energoatomizdat, 1983 11 Anisimov Yu.V. Methodological instructions for laboratory work on the discipline "Fundamentals of safety in electrical installations" and "Safety in power plants" for specialties "Electric Power Engineering" and "Energy Supply for Agriculture"

8. Content of the discipline	Provide students with the relevant knowledge necessary to: - the ability to choose electrical safety means in a particular electrical installation; - application in course and diploma design; - making competent decisions when justifying the use of electrical safety equipment in various electrical installations.

1. Basic information about the discipline:	
Name of the discipline	Operation and repair of electrical equipment
2. Number of credits	**3**
3. Prerequisites:	Mathematics, physics, installation and adjustment electrical equipment, electrical materials, TOE, electrical measurements, electronics, electrical machines.
4. Post-requisites:	Knowledge in this discipline is necessary for the implementation of course and diploma projects and the practical activities of specialists.
5. Competencies:	a) humanitarian and social competences (GSK) • willingness to cooperate with colleagues, work in a team (GSK-2); • the ability to find organizational and managerial solutions in non-standard conditions and in conditions of different opinions and the willingness to take responsibility for them • readiness for independent, individual work, decision-making within the framework of their professional competence (GSK-5); b) professional competence (PC) • the ability and willingness to use regulatory legal documents in their professional activities (PC-1); • the ability to calculate the operating modes of electric power plants for various purposes, to determine the composition of equipment and its parameters, schemes of electric power facilities (PC-5); • the ability to use technical means to measure the main parameters of electric power and electrical facilities and systems and the processes occurring in them (PC-6); • the willingness to substantiate technical solutions in the development of technological processes and choose technical means and technologies, taking into account the environmental consequences of their use (PC-8); • the ability to control the operating modes of the equipment of electric power facilities (PC-11); • readiness to study scientific and technical information, domestic and foreign experience on the research topic (PC-13); • the ability to apply test methods for electrical equipment and objects of electric power and electrical engineering (PC-17);
6. Course author	Pyastolova I.A.
7. Main literature	Eroshenko G.P. and others Operation of electrical equipment. Textbook.-M .: KolosS, 2008. - 344 p. Ermolaev S.A., Muntyan V.A., Kyurchev V.N. Operation and repair of electrical equipment and automation equipment in the AIC system. -Kiev: NPF Altur, 1997. - 415s. Pyastolova I.A. Theoretical foundations of operation. - Astana, KazATU, 2008 - 84 p. Pyastolova I.A. Technical operation of electrical equipment. - Astana, KazATU, 2009 - 174 p. Pyastolova I.A. Repair and maintenance of electrical equipment. Astana, Folio, 2008 - 202 p. Pyastolov A.A., Eroshenko G.P. Operation of e-mail equipment. -M .: Atomizdat, 1990 - 287 p. Butorin V.A. Charykov IN AND. Scientific and practical basics of electrical equipment operation. - Chelyabinsk, 2011. - 235

8. Content of the discipline. General questions of the operation of electrical equipment. Basic concepts and definitions of the theory of exploitation. Operational properties of electrical equipment. Reliability properties. Brief description of rural power supply and its reliability. The influence of the quality of electricity on the operation of electrical consumers. Features of the operating conditions of electrical receivers in the agricultural sector. and their impact on the operation of electrical equipment. Operational reliability of electrical equipment in agriculture. The theory of acquisition and diagnostics of electrical equipment. General questions of overhaul of equipment. Technology of overhaul of direct current electric machines. Technology of overhaul of AC electrical machines. Testing of AC machines after repair. Power transformer overhaul technology. Methods for drying transformer windings.

1. Basic information about the discipline:	
Name of the discipline	Energy saving in the electric power industry
2. Number of credits	**3**
3. Prerequisites:	To study the course, students must have knowledge of the following disciplines: "Mathematics 1/2", "Physics", "Theoretical Foundations of Electrical Engineering 1/2", "Electric lighting and irradiation".
4. Post-requisites:	As a result of studying this course, students will have basic knowledge for use in diploma design in the implementation of energy conservation measures at various economic facilities and enterprises.
5. Competencies:	– Know and understand (Descriptor A): factors that determine fuel economy in heat engineering processes; legislative and legal framework for energy saving. – Be able to (Descriptor B): understand the factors that determine the efficiency of energy saving in heat technology, be able to calculate and evaluate them economically. – (Descriptor C): on the proposed methods for saving energy, taking into account their effectiveness. – Communication Skills (Descriptor D): Knowledge of terminology in the field of energy saving and economy. Exchange information from foreign sources on the effective use of fuel and energy resources. – Academic Skills (Descriptor E): Using calculation methods and factors that determine energy efficiency and assessing economic performance.
6. Course author	Shukraliyev M.A.
7. Main literature	1. Law of the Republic of Kazakhstan On Energy Saving 2. Law of the Republic of Kazakhstan on Energy Saving and Energy Efficiency Improvement 3. Energy Saving in Industrial and Utilities: Textbook / A.I. Kolesnikov, M.N. Fedorov, Yu.M. Varfolomeev. - M .: INFRA-M, 2010 .-- 124 p. 4. Berezovsky N.I. Energy saving technology: textbook. allowance / N.I. Berezovsky, S.N. E.K. Kostyukevich. - Minsk: BIP - S Plus, 2007 .-- 152 p. 5. Fokin V.M. Fundamentals of energy saving and energy audit. M .: "Publishing house of Mechanical Engineering-1", 2006. -256 p. 6. Andrizhievsky A.A. Energy saving and energy management: textbook. Manual / A.A. Andrizhievsky, V.I. Volodin. - 2nd ed., Isp. - Mn. Higher. shk., 2005.- 294 p. 7. Energy saving in industry: Textbook. manual / G.Ya. Vagin, A.B. Flaps; Nizhegorod. state tech. un-t., NITsE. N. Novgorod, 1998.220 p. ISBN 5-230-03058-5.
8. Content of the discipline	– understanding of energy saving as an objective historical phenomenon and its tasks; – learning outcomes provide learners with a basic understanding of energy-saving technologies

Appendix 5. Description of the disciplines of the PD cycle

1. Basic information about the discipline:	
Name of the discipline	Electrical networks and systems
2. Number of credits	**eight**
3. Prerequisites:	The material of the discipline "Electrical networks and systems" is based on the knowledge gained during the study: - physics, theoretical foundations of electrical engineering, electrical drawings, information and measuring technology, electricalmaterials science, electrical machines, power plants and substations.
4. Post-requisites:	The knowledge and skills acquired in the study of this discipline are necessary for diploma design, as well as in production activities of the graduate.
5. Competencies:	-know and understand (descriptor A): be able to use the knowledge gained in practice, understanding of the physical processes occurring under various operating modes of electrical networks of various voltage levels. - be able to (descriptor B): the acquisition and application of practical skills in the design of electrical networks, power supply systems, the use of advanced technical solutions. -to master, acquire practical skills (descriptor C, D, E): the ability to compare, analyze various schemes and modes of electrical networks, build their own argumentation, formulate conclusions based on the results of calculations.
6. Course author	Krasnikov V.I.
7. Main literature	1 Electrical systems. Ed. V.A. Venikov. -M .: Higher school, 1971. 2 Melnikov N.A. Electric networks and systems.- Moscow: Energiya, 1975. 3 Markovich I.M. Modes of Energy Systems .- M .: Energiya, 1975. 4 Handbook for the design of electrical systems. Edited by M.S. Rokotyan and I.A. Shapiro. -M .: Energy, 1977. 5 Venikov V.A., Zhukov L.A., Pospelov G.E. Electrical systems. Operating modes of electrical systems and networks. Ed. Venikova V.A. - M .: Higher school, 1975. 6 Idelchik V.N. Electrical systems and networks. - Textbook for universities. –M .: Energoatomizdat, 1989. 7 Blok V.M. Electrical networks and systems. -M .: Higher school, 1986. 8 Electrical systems t-2. Electricity of the net. Edited by V.A. Venikov - Moscow: Higher School, 1971. 9 Venikov V.A., Ezhkov V.V., Zelenokhat N.I. and other Electric power systems in examples and illustrations. Under. ed. Venikova V.A.-M .: Energoatomizdat, 1983. 10 Kryukov K.P., Novgorodtsev B.P. Structures and mechanical calculation of power lines.-Leningrad: Energy, 1979. 11 Borovikov V.A., Kosarev V.K., Khodot G.A. Electric networks and systems. - M-JI .: Gosenergoizdat, 1963. 12 Ryabkov A.Ya. Electric networks.-M-L .: Gosenergoizdat, 1960. 13 Soldatkina L.A. Electric networks and systems.-M .: Energy, 1972. 14 Krasnikov V.I. Methodological manual for course work in the discipline "Electrical networks and systems for students of the Faculty of Energy, specialty 5B071800-Electrical Power Engineering". -Astana, S. Seifullin KazATU, 2015.
8. Content of the discipline	The discipline "Electrical networks and systems" is the main, special, designed to form the professional training of bachelors - in the specialty 5B071800 "Electrical power engineering". The general characteristics of the transmission and distribution of electrical energy, the voltage of the elements of the electrical network, the principles of the design of the power transmission line, the characteristic and calculation of the parameters of the circuit elements of the network. Calculation and analysis of steady-state

	modes of open and closed electrical networks, methods of calculation, analysis of losses of electrical energy and voltages in electrical networks .. Considered are the basics of constructing circuits for transmission and distribution of electrical energy, the choice of the cross-section of wires and cable cores, indicators and norms of quality of electricity, the balance of active and reactive power , the level of frequency and voltages in the electric power system, the basics regulation of modes.

1. Basic information about the discipline:	
Name of the discipline	Design of power supply systems
2. Number of credits	**eight**
3. Prerequisites:	-physics; -theoretical foundations of electrical engineering; -electric cars; - installation technology; -electric stations and substations; -Electricity of the net; -electricity supply.
4. Post-requisites:	- diploma design.
5. Competencies:	- Know and understand (Descriptor A) design regulations, design stages, and design stages. - Be able to (Descriptor B) calculate the consumer load, choose power supplies, modern electrical equipment and conductors of the power supply system. - Master (descriptors C, D, E) modern methods of calculating electrical loads and reactive power compensation at various stages of the power supply system, the principles of choosing substation transformers. - Acquire practical skills (descriptors C, D, E) of constructing and choosing the optimal option for the power supply scheme of the facility, choosing the main electrical equipment, ensuring the required power quality, reliability and safety of service.
6. Course author	Slipchenko S.A.
7. Main literature	1. Konyukhova E.A. Power supply of objects. - M .: Publishing house "Mastery", 2013. 2. Guzhov N.P., Olkhovsky V.Ya. Power supply systems. - Rostov n / a: Phoenix, 2011. 3. Kudrin B.I. Power supply of industrial enterprises. - M: Internet Engineering, 2012. 4. Fedorov A.A., Starkova L.E. Textbook for course and diploma design.- M .: Energoatomizdat, 1987. 5. Lipkin B. Yu. Power supply of industrial enterprises and installations. - M .: Higher school, 1990. 6. Rules for the design and safe operation of electrical installations of the Republic of Kazakhstan (PUE, PTE, PTB). - Novosibirsk: Sib. univ. publishing house, 2006. 7. Ivanov V.S., Sokolov V.I., Modes of consumption and quality of electricity in power supply systems of industrial enterprises, Moscow: Energoatomizdat, 1987. 8. Opoleva G.N. Power supply circuits and substations. - M .: Publishing House "Forum" - Infra-M, 2009. 9. Handbook on power supply and electrical equipment: 2 tons / Under total. ed. A.A. Fedorov. - M .: Energoatomizdat, 1986. 10. Power Supply Design Handbook / Ed. SOUTH. Barybina and others - M .: Energoatomizdat, 1990. 11. Vinoslavsky V.N., Dwarf A.V. Design systemspower supply. - Kiev: Vishcha school, 1981. 12. Calculation of short circuits and the choice of electrical equipment. / Ed. I.P. Kryuchkov and V.A. Starshinova. - M .: Ed. center "Academy, 2005. 13. Greysukh M.V., Lazarev S.S. Calculations by power supplyindustrial enterprises. - M .: Energy, 1977. 14. Handbook on the power supply of industrial enterprises. / Under

	total ed. A.A. Fedorov and G.V. Serbinovsky. In 2 books. - M .: Energy, 1973. 15. Handbook on the design of electrical networks and electrical equipment. / Ed. SOUTH. Barybina et al. - M .: Energoatomizdat, 1991. 16. Rekus G.G. Electrical equipment of production. - M .: Higher. school, 2007. 17. Anastasiev P.I., Branzburg E.Z. Design of cable networks and wiring. - M .: Energy, 1980. 18. Guidelines for the calculation of short-circuit currents and selection electrical equipment. / Ed. B.N. Neklepaeva. - M .: Publishing house of NTs ENAS, 2004.
8. Content of the discipline	prepare students to complete the entire list of tasks related to the design of both individual elements of the power supply system, and the entire complex of project issues, introducing new technologies, taking into account the accumulated experience in design, installation and operation electrical installations and ensuring high reliability of power supply with standardized power quality.

1. Basic information about the discipline:	
Name of the discipline	Relay protection and automation of electric power systems "
2. Number of credits	**7**
3. Prerequisites:	The material of the discipline "Relay protection and automation of electric power systems" is based on the knowledge gained in the study of disciplines: "Theoretical foundations of electrical engineering", "Electric machines", "Power stations and substations", "Power supply", "Information measuring equipment".
4. Post-requisites:	The knowledge and skills acquired during the study of the discipline are necessary for coursework and diploma design, but also in process production activities.
5. Competencies:	- to know and understand (descriptor A): to independently calculate the parameters of the operation of various types of protection, build selectivity maps, analyze the actions of protections and automation in various modes of the system, choose circuit solutions for their implementation; - be able to (descriptor B): acquisition and application of practical skills in the design of protection equipment and automation of electric power systems; - master, acquire practical skills (descriptor C, D, E): the ability to compare, analyze the operation of protection devices and automation in various modes of operation of the electric power system, draw conclusions based on the results of the analysis.
6. Course author	Anisimov Yu.V.
7. Main literature	1Chernobrov N.V., Semenov V.A. Relay protectionenergysystems: Textbook for technical schools.- M.: Energoatomizdat, 1998-798 p. 2 Shabad M.A. Calculations of relay protection and automation of distribution networks - St. Petersburg .: Energoatomizdat, 2002 - 349 p. 3 Shabad M.A. Selection of characteristics and settings of digital current protections of the SPACOM and RE_5XX series. - St. Petersburg, 2002. 4 Andreev V.A. Relay protection automation in power supply systems - M .: Higher school, 2008 - 639p. 5 Electrical Installation Code RK-Astana, 2008 6 Solovyov A.L. Methodology for calculating SEPAM settings. Technical collection Schneider Electric. Issue 3.- St. Petersburg, 2005. 7 Recommendations for the selection of settings for transformer protection devices "Sirius T" and "Sirius T3" (Sirius UV) - Cheboksary .: Company "RadiusAutomation ", 2002. 8 Guidelines for the selection of settings "Sirius DZ-35" - Cheboksary .: CJSC "Radius Automatics", 2004. 9 SIPROTEC. Digital terminal for overcurrent protection 7SJ600 - Technical description. - ABB Relay - Cheboksary, 2005. 10 Transformers and autotransformers 35-220 kV. Differential current protection. Payment settings. Methodical directions. STC "Mekhanotronika" .- St. Petersburg 11 Methodical instructions for practical and laboratory work in the discipline "Relay protection and automation electric power

	systems "Astana, 2015. 12 Methodical instructions for laboratory work on relay protection and automation at the educational and laboratory complex "Model of an electrical system with a complex load node" for students of the specialty "Electric Power Engineering" - Astana, 2006. 13. Barzam Arp. B. System Automation - Moscow: Energiya, 1973
8. Content of the discipline	provide students with the relevant knowledge necessary for independent use in the design of relay protection and automation electric power systems using modern digital devices.

1. Basic information about the discipline:	
Name of the discipline	Electric cars
2. Number of credits	**6**
3. Prerequisites:	The study of the course "Electrical Machines" is based on the disciplines: physics, mathematics, electrical materials, theoretical foundations electrical engineering.
4. Post-requisites:	The knowledge and skills acquired by students in the course of studying this course will be used in the future in the study of disciplines of the energy profile: operation of electrical equipment, design of electrification systems, design of power supply systems, diploma design, automated electric drive.
5. Competencies:	- the ability and willingness to analyze scientific and technical information, to study domestic and foreign experience on the research topic (PC-6); - the ability to develop simple designs of power and electrical facilities (PC-9); - the ability to use modern information technologies, manage information using business applications; use network computer technologies, databases and application packages in their subject area (PC-19); - the ability to self-study and master new knowledge and skills for the implementation of their professional career (NPK2);
6. Course author	Gerasimenko T.S.
7. Main literature	1. Design electrical machines. / Under overall editorsI.P. Kopylova. M .: Higher school, 2002. 2. Ivanov-Smolensky A.V. Electric cars. In two volumes. 3-edition.-M .: Publishing house MEI, 2006-652 (656) b. 3. Katsman M.M. Electric cars. 5th edition, revised and supplemented.-M .: Publishing Center "Academy", 2003.-496 b. 4. Bespalov V.Ya., Kotelenets N.F. Electric machines.-M .: MPEI Publishing House, 2006-320 b.
8. Content of the discipline	Studying this discipline will allow students to acquire knowledge and skills in the calculation, design of electrical machines, which are necessary in further practical activity, as well as with an increase professional level through a master's degree.

1. Basic information about the discipline:	
Name of the discipline	Transient processes in the electric power industry
2. Number of credits	**five**
3. Prerequisites:	physics, mathematics, information and measuring technology, theoretical foundations of electrical engineering - 1 and 2, mathematical problems and computer modeling
4. Post-requisites:	Design of power supply systems, Relay protection and automation of EPS, as well as the implementation of diploma design and production graduate activities
5. Competencies:	After completing the study of the discipline, the student must have an idea of \ u200b \ u200bthe physics of the flow of transient processes (PP) and modes in electrical installations of SES (power supply systems), classification signs and methods of calculating PP both analytically and using a PC

	for the subsequent design and operation of electrical installations (EP); know and understand (descriptor A): the main sources of scientific and technical information (STI) and guidance documents (RD) on the calculation of transient processes in ES; modern IT-technologies (software and algorithms) for building models (equivalent circuits) of power plants and subsequent calculation of the PP; analytical method for calculating electromagnetic and electromechanical PP, as well as measures and means of limiting the negative impact of PP on the normal operation of the power plant; be able to apply knowledge (descriptor B): fulfill the requirements of the RD when calculating the PP, analyze the design conditions (initial data and basic conditions); analytically or on a PC, draw up equivalent circuits for power plants and implement the calculation of a typical PP (short circuit); based on the results of the PP calculations, draw conclusions and determine measures to limit the negative consequences of the PP in the form of submitting a technical report with its public protection; possess skills (descriptor C, D, E): discussions using professional terminology, fundamental provisions and laws of the physical, mathematical and electrical apparatus; the use of various methods (analytically or with the use of IT technologies) and methods for calculating the PP; analysis of the results of calculating the PP in SES for the purpose of designing power plants (testing for durability and stability) and their operation (setting up relay protection and automation) fundamental provisions and laws of physics, mathematics and electrical engineering; the use of various methods (analytically or with the use of IT technologies) and methods for calculating the PP; analysis of the results of calculating the PP in SES for the purpose of designing power plants (testing for durability and stability) and their operation (setting up relay protection and automation) fundamental provisions and laws of physics, mathematics and electrical engineering; the use of various methods (analytically or with the use of IT technologies) and methods for calculating the PP; analysis of the results of calculating the PP in SES for the purpose of designing power plants (testing for durability and stability) and their operation (setting up relay protection and automation)
6. Course author	Rozhkov V.I.
7. Main literature	1. Rules for the Installation of Electrical Installations of the Republic of Kazakhstan (PUE) / Approved by the Government of the Republic of Kazakhstan No. 1355 dated 24.10.2012. 2. Guidelines for the calculation of short-circuit currents and the selection of electrical equipment. RD 153-334.0-20.527-98 / Ed. B.N. Neklepaeva. - M .: Publishing house NTs ENAS, 2000. 3. Kulikov Yu.A. Transient processes in electrical systems. - Novosibirsk: Publishing house of NSTU, 2006. 4. Ulyanov S.A. Electromagnetic transients in electrical systems. - M .: Energy, 1970. 5. Short circuits and the choice of electrical equipment / Ed. I.P. Kryuchkova, V.A. Starshinova V.A. - M .: MPEI Publishing House, 2012. 6. Gotman V.I. Short circuits and unbalanced modes in electrical systems. - Tomsk: TPU Publishing House, 2011. 7. Venikov V.A. Transient electromechanical processes in electrical systems: a textbook for electrical power specialties of universities. - M .: Higher school, 1985. 8. Kravchenko A.A. Transient processes in the electric power industry: educational and methodological complex of the discipline. - Astana: KATU, 2010.
8. Content of the discipline. The discipline provides for the study of material in two modules: module 1 "Electromagnetic PP", which is aimed at mastering professional terminology for the course, classification signs of typical modes and processes (occurring in the plant), a general algorithm for calculating any type of short circuit and consolidating the concept of physics of the flow of software by considering typical problems of calculating symmetric and asymmetric types of short circuit at an arbitrary moment in time in a high voltage power plant, including the conditions for bringing and converting various types of equivalent circuits; module 2 "Electromechanical PCBs", which is aimed at consolidating the skills of calculating various types of short circuits in medium and low voltage electrical installations, as well as mastering general principles, requirements and methods calculation of electromechanical PP by considering typical problems for calculating stability in the analysis of starting and self-starting of electric motors.	

1. Basic information about the discipline:	
Name of the discipline	Power stations and substations

2. Number of credits	**6**
3. Prerequisites:	The material of the discipline "Power Plants and Substations" is based on the knowledge gained during the study: - physics, theoretical fundamentals of electrical engineering -1, theoretical foundations of electrical engineering -2, electrotechnical blueprints, informational measuring technology, insulation in electrical installations...
4. Post-requisites:	The knowledge and skills acquired in the study of this discipline are necessary for course and diploma design, as well as in the study of the following disciplines: -electricity supply, electrical networks and systems, relay protection and

	automation of electric power systems.
5. Competencies:	-know and understand (descriptor A): be able to use the acquired knowledge in practice, understanding of physical processes, equipment designs, electrical connection diagrams of power plants and substations. - be able to (descriptor B): the acquisition of practical skills for the design and production activities at facilities "Electric power industry". -to master, acquire practical skills (descriptor C, D, E): C-ability to compare, analyze different situations, build your own argumentation, formulate conclusions in the design and operation of electrical equipment of the station and substation. D - in the field of communication, the formation of a correct attitude towards various scientific schools and trends, various technical solutions to the problem being implemented. E - in the field of training, the ability to analyze and make the right technical decisions in design and practical activities at the facilities of "electric power" to be guided by the modern scientific and technical trends of the discipline being studied.
6. Course author	Krasnikov V.I.
7. Main literature	1 Electrical part of stations and substations: textbook / ed. Vasilyeva A.A. in 2 parts.- M .: Energoatomizdat, 1990. 2 Rozhkova L.D. Electrical equipment of power plants and substations: textbook / L.D. Rozhkova, L.N. Karneeva, T.V. Chirkova. - M .: Publishing Center "Academy", 2010. 3 Artyukhov I.I. Electrical equipment of power plants and substations: a tutorial / I.I. Artyukhov, V.D. Kulikov, V.V. Tyutmanova - Saratov: SSTU, 2006. 4 B.N. Neklepaev Electrical part of power plants: textbook / B.N. Neklepaev .- Moscow: Energy, 1977. 5 Ismagilov F.R. Ismagilov, T. Yu. Volkova, N. K. Potapchuk. - Moscow: Publishing Center "Academy", 2011. 6 Guidelines for the calculation of short-circuit currents and the selection of electrical equipment: instructions RD 153-34.0-20.527-98 / ed. Neklepaeva B.A. - M .: Publishing house of NTs ENAS, 2001. 7 Calculation of short circuits and selection of electrical equipment:tutorial / I.P.Kryuchkov, B.N.Neklepaev, V.A.Starshinov and others; ed. I.P.Kryuchkov and V.A.Starshinova.-M .: Publishing Center "Academy", 2008. 8 A.V. Kabyshev Lightning protection of electrical installations of power supply systems: a tutorial / A.V. Kabyshev.-Tomsk: TPU Publishing House, 2006. 9 High voltage technique: textbook / IM Bogatenkov, Yu.N. Bocharov, NI Gumarova, GM Imanov and others; ed. G.S. Kuchinsky. SPb .: Energoatomizdat, 2003.
8. Content of the discipline	The discipline "Power Plants and Substations" is the main, special, designed to form the professional training of bachelors - in the specialty 5B071800 "Power Engineering". Master the basic scientific and technical principles and skills for studying the disciplines of post-requisite, graduate design, as well as for production activities.

1. Basic information about the discipline:	
Name of the discipline	Automated electric drive
2. Number of credits	**five**
3. Prerequisites:	When studying "Automated electric drive" knowledge is required in the following disciplines: mathematics 1/2; Theoretical Foundations of Electrical Engineering 1/2; Electric cars.
4. Post-requisites:	Operation and repair of electrical equipment, design of power supply systems, diploma design, production

	activity.
5. Competencies:	– the ability to generalize, analyze, perceive information, set a goal and choose ways to achieve it (OK-1); – readiness for independent, individual work, decision-making within the framework of their professional competence (OK-7); – the ability to master the main methods, ways and means of obtaining, storing, processing information, the willingness to use a computer as a means of working with information (OK-11).
6. Course author	Isenov S.S.
7. Main literature	1. Zhumagulov K.K., Sagitov P.I., Isenov S.S., Suleimenova G.O. Avtomtandyrylғan elektrzhetteg (I bulim): -Astana: S. Seifullin atyndagy KazATU baspasy, 2018 .-- 112 p. 2. Zhumagulov K.K., Sagitov P.I., Isenov S.S., Suleimenova G.O. Automated electric drive (part II Energy saving by means of automated electric drive): a tutorial. -Astana: KazATU them. S. Seifullina, 2018 .-- 102 p. 3. Onishchenko G.B. Electric drive. - M .: RAAS. 2003. - 320 4. Shebes M.R., Kablukova M.V. Problem book on the theory of linear electrical circuits: Textbook for electrical, radio engineering specialties of universities. -4th building, revised and supplemented - M .: Higher school, 1990 - 544 p. 5. Electric drive theory. / Danilov P.E., Baryshnikov V.A., Rozhkov V.V. / M.: Berlin: Direct-Media, 2018. - 415 p. 6. Moskalenko V.V. Automated electric drive. - M .: Academia, 2014 .-- 368 p. 7. Slides on the discipline "Automated electric drive".
8. Content of the discipline	- master the basic scientific principles of generating energy using an automated electric drive; - know the device, the principle of operation and the basics of operation of installations using an automated electric drive; - master the methods of designing an automated electric drive; - teach students on their owncarry out elementary laboratory studies of electric drives; - methods appraisalstechnical and economic and national economicvalues of using an automated electric drive.