

PAVLODAR STATE UNIVERSITY NAMED AFTER S. T ORAIGHYROV



MODULE HANDBOOK
of specialty **5B071700 «Heat Power Engineering»**



Akkreditierungsagentur für Studiengänge der Ingenieurwissenschaften, der Informatik, der Naturwissenschaften und der Mathematik e.V.

Pavlodar, 2017

Reference of modules

(EPof bachelor degree)

1 General obligatory modules

Module name	Public history
Courses of academic disciplines according to modules	History of Kazakhstan
Semester, in which module was learned	1
Responsible for module	MalikovA.V., KaskabasovA.A.
Working language	Russian, Kazakh
Matchingwithcurriculum	EPPower system Obligatory component
Form of education/Number of academic hours	Lecture - 30 Seminars - 15 IWS -105
Assignment /workload	150 hours
Credits/test units	5 ECTS
Requirements, according to examination procedure	FSAPSU 8.01.2-09 «Control and assessment of academic achievements of students »
Condi tions of education reception according to modules	Preliminary knowledge or passing future modules (prerequisites) «History»; «Philosophy» «History of Kazakhstan»; «Person and society»; «Culturology».
Academic purposes/results and competences	To have imagination: about main ideological directions of development history of Kazakhstan, about main stages and special historical process on Kazakhstan territory since ancient time till our days. To know: development history of human society in Kazakhstan, as basic part of world historical process, development dynamic of native history (active powers, mechanisms, tendencies, laws of development history), general course of history (history structure, its dynamic), traditions and culture of Kazakhstan nations. To be able to: to establish the causal investigative communication in history of Kazakhstan, to comprehend historical events and cases on base of comparative analysis, creatively apply historical knowledge on practice

	To have skills: to analyse historical events To be competent: to work up predictions of historical events. To be tolerant to traditions, culture of other nations of the world.
Content	Kazakhstan in the ancient time, Kazakhstan in the period of the early and developed Middle Ages, Kazakhstan on XIII - XV centuries, Ethnogenesis of Kazakh people. Kazakh khanate, Accession of Kazakhstan to Russia, People's liberation fight of Kazakh people at the end of XVIII - the middle of the XIX centuries, Kazakhstan as a part of the Russian Empire (the second half of XIX - the beginning of the XX centuries), Social movement in Kazakhstan the beginnings of XX c., Kazakhstan in 1917 - 1920. Social and economic transformations in the 20-30th of the XX century, Political and cultural life in the 20-30th, Kazakhstan in the period of the Great Patriotic War, Kazakhstan in post-war years, Kazakhstan in 1965 - 1991, Independent Kazakhstan
Forms of final control	Examination
Technical and electronic methods of education	Electronic methods of education: Slide- lectures, presentations, books, chrestomathy, electronic dictionaries. Technical methods of education: screen projector, electronic board, laptop
Literature	1 BatpenovaZ.S., FominykhV.V. History of Kazakhstan. Methodical recommendations for independent work of students of all specialties of 1 course. - Ust Kamenogorsk, 2004 2 History Kazakh the Soviet Socialist Republic since the most ancient times up to now in 5 t.- Almaty, 1977-1981 3 History of Kazakhstan since the most ancient time up to now in 4(5)t. - Almaty, 1996-2000. T. 1-3. 4 PankovskayaG.I., Fominykh V.V. History of Kazakhstan in schemes, tables, diagrams. - Ust Kamenogorsk, 2008

	<p>5 Pankovskaya G.I., Fominykh V.V. History of Kazakhstan. Abstracts of lectures for students of technical colleges. - Ust Kamenogorsk, 2009</p> <p>6 Pankovskaya G.I., Fominykh V.V. History of Kazakhstan. Chronological guide. - Ust Kamenogorsk, 2011</p>
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Module name	Mathematics 1, 2
Courses of academic disciplines according to modules	Mathematics 1, Mathematics 2
Semester, in which module was learned	1,2
Responsible for module	ShomanovaR.E.
Working language	Russian, Kazakh
Matchingwithcurriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education Lectures - 30 hours Practical lessons - 45 hours Laboratory lessons - 15 hours IWS - 210 hours
Assignment /workload	General quantity of hours: - 300 hours Among them: lectures- 30 hours Practical lessons - 45 hours Laboratory lessons -15 hours IWS - 210 hours
Credits/test units	10 ECTS
Requirements, according to examination procedure	FSAPSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Knowledge of all types of mathematics chapters of preschool course
Academic purposes/results and competences	<p>To know: bases of elementary mathematics, skills of actions with fractions, addition and subtraction of numbers with different signs, skills of transformation of various algebraic expressions, properties of trigonometrical and logarithmic functions, creation of schedules of functions, properties of various geometrical figures.</p> <p>To be able to: to apply elements of linear algebra, analytical geometry, differential calculus of function of one variable</p>

	<p>To have skills: independently to carry out calculations of the section of elementary mathematics, to carry out creation of graphic of functions.</p> <p>To be competent: to make numerical calculations of various algebraic expressions.</p>
Content	<p>Determinants. Matrixes.</p> <p>Systems of the linear algebraic equations.</p> <p>Vectors. The scalar, vector and mixed works of vectors.</p> <p>Linear geometrical objects.</p> <p>Introduction in the mathematical analysis.</p> <p>Concept of a set. Elements and symbolic of mathematical logic. Numerical sequences and their limits.</p> <p>Function limit in a point. Function continuity.</p> <p>Derivative of function of the first and the highest orders.</p> <p>Function research.</p> <p>Integral calculus.</p> <p>Functions of several variables.</p> <p>Private derivatives and full differentials of the highest orders. Implicit functions. Double integrals and their calculation. Curvilinear integrals of I and II genres, and their supplements.</p> <p>Numerical ranks. Signs of convergence of numerical ranks and research of ranks on convergence. Functional and power series.</p> <p>Decomposition of functions in power series.</p> <p>Fourier's number.</p> <p>Integration of the equations. Differential equations of the highest orders.</p> <p>Elements of probability theory and mathematical statistics.</p> <p>Complex numbers and actions over them.</p> <p>Functions of the complex variable 3. Integration and differentiation of functions of the complex variable. Taylor and Laurent's ranks.</p> <p>Operational calculation. Laplace's transformations and their property. Probability theory elements.</p> <p>Random</p>

	variables, their laws of distribution and numerical characteristics. Elements of mathematical statistics. Criteria of a consent. Correlation elements.
Forms of final control	Examination
Technical and electronic methods of education	Electronic textbooks on mathematics, Carrying out lessons with use of an electronic board
Literature	<ol style="list-style-type: none"> 1. Kudryavcev L.D. Course of the mathematical analysis. T. 1,2. M.: High school, 1981. 2. Under edition Ryabushko A.P.. The collection of individual tasks on mathematics p.1,2. Minsk. : The highest school, 2001. 3. Shopachev V. S. High mathematics M.: High school, 1999. 4. Nikolskiy S.M. Course of the mathematical analysis. M.: Science, 1990. 5. Khidamiyev N.G., Bokenov A.O. Elements of linear algebra. Part 1, Ust Kamenogorsk, 2004. 6. Chi-Dun-Chi Yu. V., Sidorenko V.N., Kitapbayev M.K. The higher mathematics in questions and tasks. Differential and integral calculus. Ust Kamenogorsk, 2002.

Module name	Processing and information analysis
Courses of academic disciplines according to modules	Information science
Semester, in which module was learned	1
Responsible for module	Krivoruchko E. V.
Working language	Russian, Kazakh
Matching with curriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education Lectures - 15 hours Laboratory lessons - 7,5 hours Practical lessons - 22,5 hours IWS- 105 hours
Assignment /workload	General quantity of numbers: - 150 hours Among them: lectures- 15 hours Laboratory lessons - 7,5 hours

	Practical lessons - 22,5 hours IWS - 105 hours
Credits/test units	5 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering modules: mathematics
Academic purposes/results and competences	<p>As a result of module studying the student should:</p> <p>to have imagination: about algorithmization of tasks, programming methods, types of data;</p> <p>to know: classification of operators of language of high level, standard modules, dynamic structures of data, methods of design of the software, methods of debugging and testing of programs;</p> <p>to be able: to develop block diagrams of various algorithms, to organize structures of data, it is correct to choose methods of the solution of tasks;</p> <p>to have practical skills: to develop programs with use of means of language, to write programs in good style. to be competent: in the field of information processing and management with use of computer aids; to apply modern computer facilities, to use information technologies in the sphere of professional activity</p>
Content	<p>Concept about the software of the personal computer. Methods of automation of programming. Algorithmic languages and requirements to them. Concepts procedure oriented languages and object-oriented programming. Dialogue means of communication of users with the computer. The integrated programming systems. Algorithm definition. Ways of the description of algorithms. I ruled registrations of flowcharts of algorithms. Versions of structures of algorithms. Organization of algorithms of cyclic</p>

	<p>structure. Classification of statements of technical tasks. Standard components: analysis, synthesis, decision-making. Programming in the basic procedural focused algorithmic language. Language alphabet. Records rules of the main objects of language. Classification of operators of algorithmic language. Program structure. Sub-programs of the user, their classification. Programming with use of external data carriers and dynamic memory. Use of graphic opportunities of language. Creation of objects and their use. Prospects of development of languages and technology of programming.</p>
Forms of final control	Examination
Technical and electronic methods of education	The stand for laboratory works "Measuring equipment", the pack of programs «Electronics' Workbench».
Literature	<p>1 Davidov V.G. Programming and algorithmization bases. - M.: High school, 2003. 2 Kernian B., Plodner F. Elements of style of programming. - M.: Radio and communication, 1984. 3 Khuyz DZh., Michtom G. Structural approach to programming - M.: Edition «World», 2002.</p>

Module name	Physics
Courses of academic disciplines according to modules	Physics
Semester, in which module was learned	2
Responsible for module	Igonin S.I.
Working language	Russian, Kazakh
Matching with curriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education Lectures - 15 hours Laboratory lessons - 7.5 hours Practical lessons - 30 hours IWS- 127.5 hours
Assignment /workload	General quantity of numbers: - 180 hours

	Among them: lectures- 15 hours Laboratory works – 7,5 hours Practical lessons - 30 hours IWS – 127.5 hours
Credits/test units	6 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering modules: mathematics
Academic purposes/results and competences	<p>As a result of module studying the student should:</p> <p>to have imagination: of a modern picture of the world and scientific outlook;</p> <p>to know: essence of fundamental laws of classical and modern physics;</p> <p>to be able: to estimate degree of reliability of the results received by means of experimental and theoretical methods of research;</p> <p>to have skills: solutions of standard problems of discipline from various areas of physics, carrying out pilot studies.</p> <p>To be competent: in application of theoretical physical laws and methods in practice.</p>
Content	<p>Physics as science about forms of movement of a matter and the general laws of the nature. The most important stages of development of physics. The wave equation for an electromagnetic field. Concept about beam optics. Properties of light waves. Electromagnetic waves in substance.</p> <p>Thermal radiation. Basic provisions of the quantum theory. Elements of quantum electronics. The condensed condition. Methods of research of crystal structures. Conductivity of metals. Own and impurity conductivity. Quantum ideas of properties of ferromagnetics.</p> <p>Atomic nucleus. Exchange character of nuclear forces. Kernel models. Nuclear reactions. Problem of power sources.</p>

Forms of final control	Examination
Technical and electronic methods of education	Laboratory stands
Literature	<p>Savelyev I.V. Course of the general physics. Manual for the university. In 5 books. M. Astrel / AST 2003. Trophimova T.I. Short course of physics: Manual for the university. 2nd, corrected - 352 page, M: High school, 2002. Grabovskiy R.I. Course of physics: Manuals for the university. Edition 6th - 608 p. (Manuals for the university: Special literature), 2002.</p> <p>Trophimova T.I. The collection of tasks of a physics course for the university: Manual for technical specialties of higher educational institutions. Edition 3rd - 384 p. M: Onix 21 century/World and education, 2003.</p>

Module name	Ecology and health and safety
Courses of academic disciplines according to modules	Ecology and sustainable development. Health and safety bases
Semester, in which module was learned	3, 4
Responsible for module	Seitzhanova D.B. Semenova M.K., Aimukhanov S.M.
Working language	Russian, Kazakh
Matching with curriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education Lectures - 30 hours Practical lessons - 30 hours IWS - 120 hours
Assignment /workload	General quantity of numbers: - 180 hours Among them: lectures- 30 hours Practical lessons - 30 hours IWS - 120 hours
Credits/test units	6 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Ecology

Academic purposes/results and competences	<p>To have imagination: about monitoring of an ecological condition of habitat.</p> <p>To know: bases of identification of factors and sources of negative impact on the environment, caused by activity of the person; modern, including information means and methods of forecasting, assessment and management of a state of environment.</p> <p>To be able: to estimate influence of ecological factors on population health; to develop programs of development and optimization of an ecological condition of the region; to put into practice a complex of knowledge in the field of the international cooperation on environmental protection from influence of negative factors of the natural and technogenic environment.</p> <p>To have skills: to organize work of services of ecological safety; to conduct researches in the sphere of the ecology, a sustainable development and health and safety.</p> <p>To be competent: in anticipation of the main processes in the sphere of the ecology, a sustainable development and health and safety.</p>
Content	<p>Health and safety: Problems of a course. Acts. Emergency classification. Assessment of situations in an emergency. The principles and ways of protection of the population in an emergency. Shelters. Evacuation and dispersal.rescue and urgent emergency recovery operations.</p> <p>LP: Acts. Safety measures. Industrial sanitation. SIZ. Fire safety.</p>
Forms of final control	Examination
Technical and electronic methods of education	Electronic manual, electronic tests, electronic trainings.
Literature	ArustamovE.A. Health and safety:The textbook for students of an average professional institution -M.: Academy, 2004.

	<p>2 Atamanuyk V.G. Civil defense /Manual for the university, -M.: High school, 1986.</p> <p>4 Barinov A. V. Emergency situations of natural character and protection against them: Manual.- 2003.</p> <p>5 Belov A. S. Health and safety:Manual for the university,- M.:High school, 1999.</p> <p>6 Guseinov V.F., Zakhmatov A.A. Methodical instructions according to a situation in an emergency, part 1,2,3. Ust Kamenogorsk, East Kazakhstan state technical university, 2003.</p>
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Module name	Social sciences
Courses of academic disciplines according to modules	Sociology Politology
Semester, in which module was learned	2,3
Responsible for module	Artykbayeva G.T., Kappasova G.M.
Working language	Russian, Kazakh
Matching with curriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education Lectures - 30 hours Practical lessons - 30 hours IWS- 120 hours
Assignment /workload	General quantity of numbers: - 180 hours Among them: lectures- 30 hours Practical lessons - 30 hours IWS - 120 hours
Credits/test units	6 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering the modules: History of Kazakhstan
Academic purposes/results and competences	<p>As a result of module studying the student should:</p> <p>To have imagination: about essence and the main concepts of sociology, political science as social sciences; about the main ideological directions of development of political science.</p> <p>To know: main conceptual theories and</p>

	<p>laws of sociology, political science; main stages and relationships of cause and effect of development of political science; current trends of development of political science and social development of society; the social and ethical values based on public opinion, traditions, customs, public norms and to be guided by them in the professional activity.</p> <p>To be able: to establish relationships of cause and effect in political science; adequately to guide in various social situations.</p> <p>To have skills: to analyze historical events and the modern political environment, to apply sociological methods in the professional field.</p> <p>To be competent: to develop predictions of tendencies of development of the political environment, to apply fundamental laws of sociology in professional activity.</p>
Content	<p>Essence and the main concepts of sociology, political science as social sciences; about the main ideological directions of development of political science. Main conceptual theories and laws of sociology, political science; main stages and relationships of cause and effect of development of political science; current trends of development of political science and social development of society; the social and ethical values based on public opinion, traditions, customs, public norms and to be guided by them in the professional activity. The analysis of historical events and the modern political environment to apply sociological methods in the of professional area.</p>
Forms of final control	Examination
Technical and electronic methods of education	Laboratory stands
Literature 1.	<p>Modern western sociology. Dictionary. - M., 1990.</p> <p>Social dictionary. - Minsk, 1991.</p>

	<p>Kravchenko A.I. Sociology: Manual for the university. - M., 2011.</p> <p>Dobrenkov V.I., Kravchenko A.I. Sociology. - M., 2010.</p> <p>Modern western sociology. Dictionary. - M., 1990.</p> <p>Social dictionary. - Minsk, 1991.</p> <p>Kravchenko A.I. Sociology: Manual for the university. - M., 2011.</p> <p>Dobrenkov V.I., Kravchenko A.I. Sociology. - M., 2010.</p> <p>Volkov Yu.G. Sociology: Manual. - M.: Knorus, 2011.</p> <p>.NazarenkoS.V. Sociology. - M., 2009.</p>
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Module name	Polylanguage preparation
Courses of academic disciplines according to modules	Foreign language Kazakh/Russian
Semester, in which module was learned	1, 2
Responsible for module	Kulakhmetova N.S., Poceluyeva N.V., Shakhman A.P.
Working language	Russian, Kazakh
Matching with curriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education Practical lessons - 165 hours (30 students) IWS - 405 hours (60 students)
Assignment /workload	General quantity of hours: - 570 hours Among them: Practical lessons - 165 hours IWS -405 hours
Credits/test units	19 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Possession of languages bases
Academic purposes/results and competences	To have imagination: about the most frequency specific grammatical phenomena of basic and natural and humanitarian and technical sublanguages to know: Students should know phonetics: the basic rules of reading and pronouncing letters of the alphabet and combinations of

	<p>letters in a speech stream; spelling: writing of letters and the combinations of letters corresponding to certain sounds, spelling compliances to the most frequency lexical and grammatical signs of basic language; lexicon: word-formation models, contextual values of multiple-valued words, terms and lexical designs of the sublanguage corresponding to a profile of studied specialty; grammar.</p> <p>Students should:</p> <p>to be able: to understand the general contents of difficult texts on abstract and concrete subjects, including highly specialized texts; to speak quickly enough and spontaneously to communicate with native speakers without special difficulties for any of the parties.</p> <p>To have skills: to do accurate, detailed messages on various subjects; to state the opinion of the main problem, to show advantage and shortcomings of different opinions.</p> <p>To be competent: to form scientific outlook means of language, ethical principles and respect for language, country history. communicative competence, professional competence, linguistic competence, pragmatical competence, discursive competence, social cultural competence.</p>
Content	<p>Phonetic, spelling, lexical, grammatical norms of a studied foreign language. Phonetics: pronouncing and rythmical- intonational features of a foreign language, reception and reproduction of sound system of speech. Spelling: sound alphabetic system of language, basic spelling rules. Lexicon: word-formation models; basic word stock of 2500 units of basic language, and also the terms corresponding to a profile of specialty; lexicon differentiation on scopes of application. Grammar: the main parts of speech - a noun, an adjective, an adverb, a verb, an article, a pronoun, a pretext;</p>

	<p>structure of a simple and compound sentence; main models of word formation. Reading: formation of skills of fact-finding, search, studying and viewing reading. Speaking: skills of dialogical and monological speech within studied subjects. Letter: development of skills of a consecutive statement of thoughts, reasonings, and also information when writing compositions and letters of personal and business character. The translation of texts in the specialty from a foreign language on native according to language norms. Audition: perception aurally messages of household, information and professional character.</p>
Forms of final control	examination
Technical and electronic methods of education	Multimedia class (computers with columns and earphones), electronic dictionaries
Literature	<ol style="list-style-type: none"> 1. Essential Grammar in Use. Murphy R. - Cambridge University Press:2002 2. Understanding and Using English Grammar, third edition. Betty Schrumpfer Azar - Longman: 1999 3. Semenova S.D. Mastering English Grammar. Methodical instructions on English for students of 1 and 2 courses of all specialties, East Kazakhstan State Technical University- Ust Kamenogorsk 1 Demidova A.K. The manual is on Russian. Scientific style. Registration of scientific work: The manual / A.K.Demidova. - M.: Russian language, 1991. - 201 p. 2 Kadrzhanov K.K. Russian. Practical course. For the Kazakh groups of technical specialties of the university/ K.K. Kadrzhanov. - Almaty: 2005. - 324 p. 3 Manual on scientific style of speech. For a technical profile the university / Edited by I.G.Proskuryakova. - Moscow, 2004. - 230p. 4 Russian: The manual for students of the Kazakh offices of university / Edited by K.K.Akhmedyarova, K. Zharkynbekova Highway. - Almaty: Kazakh university,

	<p>1999. - 156 p.</p> <p>5Shayakhmetova N. K. Education in scientific style: Educational manual/ Shayakhmetova N. K. - Almaty: Evero, 2007. -189 p.</p> <p>6Adskova T.P. Russian in technical the university. Practice on scientific style of speech: The manual / Adskova. - Almaty: Edition LEM LLP, 2004. - 212 p.</p> <p>7 Aubakirova K.T. The collection of exercises on Russian stylistics: Educational manual/ K.T. Aubakirova. - Almaty: Print, 2005. - 136 p.</p>
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Module name	Theory of scientific research
Courses of academic disciplines according to modules	Philosophy
Semester, in which module was learned	3
Responsible for module	Yerzhanov E.A.
Working language	Russian, Kazakh
Matchingwithcurriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education Lectures - 15 (60 students) Practical lessons - 30 hours (30 students) IWS - 105 hours (60 students)
Assignment /workload	General quantity of hours: - 150 hours Among them: lectures- 15 Practical lessons - 30 hours IWS -105 hours
Credits/test units	5 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Prerequisites: «History of Kazakhstan»
Academic purposes/results and competences	To have imagination: about the main ideological directions of development history of Kazakhstan, about the main stages and features of historical process in the territory of Kazakhstan since the most ancient times up to now. To know: development history of human

	<p>society in Kazakhstan as component of world historical process, dynamics of development of national history (driving forces, mechanisms, tendencies, regularities of historical development), the general course of history (structure of history, its loudspeaker), tradition and culture of Kazakhstan people.</p> <p>To be able: to establish relationships of cause and effect in the history of Kazakhstan, to comprehend historical events and the cases on the basis of the comparative analysis, creatively use historical knowledge on practice.</p> <p>To have skills: to analyze historical events To be competent: to develop predictions of historical events. To be tolerant to traditions, culture of other people of the world.</p>
Content	<p>Philosophy and science methodology as a branch of philosophical knowledge.</p> <p>Subject of philosophy of science. Its communication with science and philosophy. Variety of methodological concepts and problems. Main subjects of philosophy of science. Problems and results of philosophy of science. Their value for science and philosophy.</p> <p>Specifics and interrelation of the main aspects of studying of science: logic of science, science philosophy, science history, science sociology, psychology of science and other directions.</p> <p>Status and problems of science history. Assessment of development history of science as disciplines. Features of interrelation of science philosophy and science history. Methodological bases of science philosophy. Science in culture and a civilization. Science in culture system. Role and science functions in society. Science and philosophy. To history of interrelation of philosophy and science. Philosophical judgment of achievements of science. Influence of philosophical concepts on</p>

	<p>science development. Science and art. Science and religion. Influence of science on religious perception of the world.</p> <p>Religion and science dialogue. Social status of science and dynamics of change of the relation to religion. Science and education.</p> <p>World outlook aspects of science. Science as productive force. Humanistic horizons of science. Science and moral. Axiological status of science. The personality in science. Social parties of history of science. The sociality nature in science as a problem. Philosophy in the history of scientific ideas. Philosophy role in creativity of scientists. Philosophical and methodological problems of science as independent area of researches. Science concepts as neopositivism, logic of scientific research, science ontology, post-positivistic image of science. Strong communications of science with philosophy (A.Eynstein, N.Bor, V. Vernadsky, etc.).</p>
Forms of final control	Examination
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations, philosophical literature (textbooks, chrestomathy, dictionaries) in electronic form.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	<ol style="list-style-type: none"> 1 Rlychev A.N. Qualitative aspect of the world and its knowledge. M., 2001. 2 Bunge M. Philosophy of physics. M., 2003. 3 Vernadskiy V.I. Reflection of the naturalist. Scientific thought as planetary phenomenon. Book. 2, 1977. 4 Voitov A.G. Thinking self-instruction manual, 2001. 5 Voitov A.G. Philosophical basis of theoretical science, 1999. 6 Ilyin V.V., Yuldashev L.G. Modern scientific philosophy, 2003. 7 Mikeskina L.A. Knowledge philosophy, 2002.

Module name	Economical and legal literacy
Courses of academic disciplines according to modules	Economic theory bases Law bases
Semester, in which module was learned	4
Responsible for module	BaitayevaG.A., GlamazdinaL.K.
Working language	Russian, Kazakh
Matchingwithcurriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education Lectures - 30 (60 students) Practical lessons - 30 hours (30 students) IWS - 120 hours (60 students)
Assignment /workload	General quantity of hours: - 180 hours Among them: lectures- 30 Practical lessons - 30 hours IWS - 120 hours
Credits/test units	6ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Prerequisites: Politology, Sociology
Academic purposes/results and competences	<p>As a result of module studying the student should:</p> <p>To have imagination: about the main theoretical views which have been saved up in scientific heritage on economic problems; about the main concepts concerning the state and the right, morals of their modern understanding.</p> <p>To know: essence of economic events, regularities of social and economic development of society in various economic systems; mechanisms of self-regulation of the market in the conditions of limited resources; principles of state regulation of economy; bases of the constitutional system of the Republic of Kazakhstan, system of the government and their interaction with other political institutes.</p> <p>To know: to observe and systematize information, to apply logic and dialectics as a conscious method of knowledge of economic</p>

	<p>events in their interrelation; to be guided in state and legal structure of society, subjects of the government and the mechanism of its implementation.</p> <p>To have skills: to apply normative legal acts at emergence of the concrete vital circumstances connected with questions of the state and the right.</p> <p>To be competent: concerning a legal status of the person and the citizen, in search of solutions of social and economic problems taking into account institutional features of the Kazakhstan model of socially oriented market economy.</p>
Content	<p>Essence of economic events, regularities of social and economic development of society in various economic systems; mechanisms of self-regulation of the market in the conditions of limited resources; principles of state regulation of economy; bases of the constitutional system of the Republic of Kazakhstan, system of the government and their interaction with others</p>
Forms of final control	examination
Technical and electronic methods of education	<p>electronic methods of education: Slide lectures, presentations, philosophical literature (textbooks, chrestomathy, dictionaries) in electronic form.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	<p>1 Course of the economic theory / Edited by professor M. N. Chepurin and professor E.A.Kiseleva. - Kirov, 2000.</p> <p>2 The economic theory (political economy) / Edited by Vidyapin, G. P. Zhuravleva. - M. : INFRA,1999.</p> <p>3 Economy: The manual / Edited by A.S.Bulatova. - M, Lawyer, 2001.</p> <p>4 Economy: The textbook / Edited by A.I.Arkipov, A.N.Nesterenko, A.K.Bolshakova. - M: "Prospectus", 2008.</p> <p>5 Economic theory: Manual for the university / Edited by A.I.Dobrynin, H.p. of Tarasevich. - prod. GUEF, prod. "Peter</p>

- Publishing", 2007
- 6 Borisov E. T. Economic theory: Manual. Course of lectures for the university. - M: Lawyer, 1997.
- 7 The code of RK "About Taxes and Other Obligatory Payments in the Budget" with additions and changes.
8. Anthology of world political thought. In 5 tomes, 1997.
- 9The Kazakhstan political encyclopedia / Edited by T.T.Mustafin. - Almaty, 1998.
- 10 Gadzhiev K.S.Politologiya. Manual, 2005.
- 11Political science: The manual / Edited by Baydeldinov L.A. Burkhanova K.N. Solovyeva A.V. Almaty, 2001.
- 12Politology ofXXcentury. Chrestomathy in 2-parts. Saransk.1994.
- 13GadjiuyevK.S. Political science. M.,1994.
- 14Politology bases. / Edited by V.P. Pugachev. M., 1992.
- 15Political science. Manual for the university. M, Akalis. 1996.
- 16Agybayev A.N. Criminal law of PK A., 2005.
- 17Alekseev S. S. The theory is right, 1994
- 18Yu.G.Yuridicheskiye's fables entities under the civil code of RK, - And., 1996
- 19Civil law of RK. General part. A. 1999
- 20Grigoriev V. I. Administrative law of RK (the general part). A. 2002
- 21Komarov S.A. Malko A.V. State and right theory. - 1999
- 22 Bases of the right. Under the editorship of Krylov Z.G. M, 2002

2 Obligatory modules on specialty

Module name	Professional language preparation
Courses of academic disciplines according to modules	Professional - orientated foreign language Professional Kazakh/Russian
Semester, in which module was learned	3, 4
Responsible for module	OrishevskayaE.V., BerguzinovA.N.

	MergalimovaA.K., KarmanovA.E.
Working language	Russian, Kazakh
Matchingwithcurriculum	Russian, Kazakh
Form of education/Number of academic hours	EP - Power system Obligatory component
Assignment /workload	Day form of education Practical lessons - 60 hours IWS - 120 hours
Credits/test units	General quantity of hours: - 180 hours Among them: Practical lessons - 60 hours IWS -120 hours
Requirements, according to examination procedure	6ECTS
Conditions of education reception according to modules	Bases of foreign, Russian, Kazakh languages
Academic purposes/results and competences	To have imagination: about terminological system of professional activity. To know: terms and language turnovers of the professional directions. To be able: quickly have conversation on various subjects: the general, educational and professional, scientific; to communicate without preparation, without making grammatical mistakes, without visible restrictions of styles of speech. To have skills: independently study scientific literature in language a data carrier; to use professional stylistic and set phrases. To be competent: to write scientific and professional works: papers, essay, business letters, etc.
Content	Terms and language units of the professional directions. Professional stylistic and phraseological unit.
Forms of final control	Examination
Technical and electronic methods of education	Electronic methods of education: Slide lectures, presentations, philosophical literature (textbooks, chrestomathy, dictionaries) in electronic form. Technical methods of education: screen projector, electronic board, laptop

Literature	<p>1. Essential Grammar in Use. Murphy R. - Cambridge University Press:2002</p> <p>2. Understanding and Using English Grammar, third edition. Betty Schrumpfer Azar - Longman: 1999</p> <p>3. Semenova S[^]. Mastering English Grammar. Methodical instructions on English for students of 1 and 2 courses of all specialties of East Kazakhstan State Technical University - Ust Kamenogorsk</p>
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Module name	Chemistry
Courses of academic disciplines according to modules	Chemistry
Semester, in which module was learned	1
Responsible for module	Oraltayeva A.S.
Working language	Russian, Kazakh
Matching with curriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education Lectures – 15 hours, Practical lessons – 15, Laboratory - 15 hours, IWS -105 hours
Assignment /workload	General quantity of hours: - 150 hours Among them: Lectures – 15 hours, Practical lessons – 15, Laboratory - 15 hours, IWS -105 hours
Credits/test units	5ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mathematics, Physics
Academic purposes/results and competences	<p>To have imagination: about quantitative and qualitative characteristics of solutions; speeds of chemical reactions and chemical balance; oxidation-reduction processes, corrosion and ways of protection against corrosion.</p> <p>To know: fundamental laws of chemistry; structure of atoms and molecules; main regularities of course of chemical processes; properties of chemical elements and their connections; types of a chemical</p>

	<p>bond and structure of molecules; thermochemical laws and calculations of the thermochemical equations;</p> <p>To be able: to write electronic formulas of atoms of chemical elements; to define types of a chemical bond in molecules; to work out the equations of electrolytic dissociation, the molecular and ionic equations of reactions of an exchange, hydrolysis, the equation of oxidation- reduction reactions; to solve settlement chemical problems.</p> <p>To have skills: solutions of practical tasks with application of thermochemical laws.</p> <p>To be competent: in application of fundamental laws of chemistry on practice.</p>
Content	<p>Fundamental laws of chemistry; structure of atoms and molecules; main regularities of course of chemical processes; properties of chemical elements and their connections; types of a chemical bond and structure of molecules; thermochemical laws and calculations of the thermochemical equations; quantitative and qualitative characteristics of solutions; speed of chemical reactions and chemical balance; oxidation-reduction processes, corrosion and ways of protection against corrosion.</p>
Forms of final control	Examination
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations, philosophical literature (textbooks, chrestomathy, dictionaries) in electronic form.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	<ol style="list-style-type: none"> 1 Kireev V.Short course of physical chemistry 2 Pavlov . F.Primery and tasks of a course of processes and devices of chemical technology: educational manual 3 Zhukhovitsky A.D. Shratsman L.A. Physical chemistry: Studies. for

mechanic engineering specialties of the university

4 Stromberg A.G. Semchenko D.P.
Physical chemistry: The manual for the university

5 Glazov V. M. Bases of physical chemistry: The manual for technical colleges

6 Zimon A.D. Leshchenko N. F. Physical chemistry: The manual for the university

7 Kiorre D. G., etc. Physical chemistry: The manual for the university

Module name	Theoretical bases heating engineers
Courses of academic disciplines according to modules	Theoretical bases heating engineers
Semester, in which module was learned	3 semester
Responsible for module	KabdualiyevaM.M., BerguzinovA.N.
Working language	Russian, Kazakh
Matchingwithcurriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education Lecture- 30 hours Practical lessons – 7,5 hours Laboratory works- 7,5 hours IWS -105 hours
Assignment /workload	General quantity of hours: - 150 hours Among them: lecture- 30 hours Practical lessons – 7,5 hours Laboratory works- 7,5 hours IWS -105 hours
Credits/test units	5ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Physics, mathematics, chemistry, heat- mass-exchange

<p>Academic purposes/results and competences</p>	<p>To have imagination: about the basic principles of creation of cycles of thermal and refrigerating devices and cars; key parameters and characteristics of water and water vapor and other working bodies, thermal efficiency of cycles; expiration processes, transitions through sound speed. To know: fundamental laws of thermodynamics; methods of transformation of thermal energy; methods of calculation and experimental research of thermodynamic processes in power installations; schematic diagrams and basis cycles of thermal power plants, installations and the thermal cars working at industrial enterprises of various branches.</p> <p>To be able: to determine parameters of a condition of ideal and real gas and a mix of gases, and also warmth and work; to receive practical skills: works with measuring devices in volume of laboratory works when processing results of supervision; solutions of thermodynamic tasks and examples; to use tables and charts of a condition of substances.</p> <p>To be competent: in application of laws of thermodynamics in practice, practical use by tables and charts of a condition of substances.</p>
<p>Content</p>	<p>Fundamental laws of thermodynamics; methods of transformation of thermal energy; methods of calculation and experimental research of thermodynamic processes in power installations; schematic diagrams and basis cycles of thermal power plants, installations and the thermal machines, working at industrial enterprises of various branches and the basic principles of creation of cycles of thermal and refrigerating devices and cars; key parameters and characteristics of water and water vapor and other working bodies, thermal efficiency of cycles; expiration processes, transition through sound speed.</p>

Forms of final control	Examination
Technical and electronic methods of education	Electronic methods of education: Slide lectures, presentations, philosophical literature (textbooks, chrestomathy, dictionaries) in electronic form. Technical methods of education: screen projector, electronic board, laptop
Literature	1. Industrial power system and heating engineer. The reference/ Edited by Klimenko A.V. - M: Prod. MEI house, 2007. - 630 pages. 2. Power system and heating engineer. General questions: directory. / Edited by Klimenko A.V. V. M. Zorin - M: Prod. MEI house, 2007. - 527 pages.

Module name	Boiler installations and steam generators
Courses of academic disciplines according to modules	Boiler installations and steam generators
Semester, in which module was learned	5
Responsible for module	Prikhodko E.V., Tulebayeva Zh.A.
Working language	Russian, Kazakh
Matching with curriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education lecture- 30 hours Practical lessons - 15 hours IWS -105 hours
Assignment /workload	General quantity of hours: - 150 hours Among them: lecture- 30 hours Practical lessons - 15 hours IWS -105 hours
Credits/test units	5ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mathematics, physics, chemistry, heat- mass-exchange, mechanics of liquid and gas
Academic purposes/results and	To have imagination: about mechanisms of

competences	<p>transformation of the energy, realized in boiler units.</p> <p>To know: technique of design and testing thermal calculation of the boiler; interrelation of the thermal and physical and chemical processes happening in steam generators; characteristic and organization of operation of the service equipment of boiler installations.</p> <p>To be able: to choose type and characteristics of the boiler unit depending on its technological appointment; to carry out calculations of the boiler and its separate surfaces of heating; to analyze a technical condition of boiler installation; to estimate technical and economic indicators of work of a copper and indicators of reliability of work of its surfaces.</p> <p>To be competent: in questions of thermal work of coppers of a various look and the analysis of efficiency of their work.</p>
Content	<p>The mechanism of transformation of the energy, realized in boiler units; technique of design and testing thermal calculation of the boiler; interrelation of the thermal and physical and chemical processes happening in steam generators; characteristic and organization of operation of the service equipment of boiler installations.</p>
Forms of final control	Examination, term paper
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations, dictionaries in electronic form.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	<ol style="list-style-type: none"> 1 Sidelkovsky L.N. Yurenev V. N. Steam generators of the industrial enterprises. M: Energy, 1978. 2 Styrikovich M. A. Katkovsky K.Ya. sirs E.P.Parogeneratory of power plants. M: Energy, 1966. 3 Reznikov M. I. Steam generating installations of power plants. M: Energy, 1974.

	<p>4 Reznikov M. I. Lipov YU.M. Boilers of thermal power plants. The manual for the university - M: Energoizdat, 1981.</p> <p>5 Kovalev A.P. etc. Steam generators. The manual for the university- M: Energoatomizdat, 1985.</p> <p>7 Lipov YU.M. Samoilov YU.F. Z.G model. Configuration and thermal calculation of steam generators. M: Energy, 1975.</p>
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Module name	Thermal engines
Courses of academic disciplines according to modules	Superchargers and thermal engines Theoretical bases of thermal power plant
Semester, in which module was learned	5, 6
Responsible for module	Talipov O.M., Mergalimova A.K.
Working language	Russian, Kazakh
Matching with curriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education: lecture- 45 hours Practical lessons - 30 hours IWS -165 hours
Assignment /workload	General quantity of hours: - 240 hours Among them: lecture- 45 hours Practical lessons - 30 hours IWS -165 hours
Credits/test units	8ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mathematics, physics, chemistry, heat-mass-exchange, mechanics of liquid and gas
Academic purposes/results and competences	<p>To have imagination: about an essence of the theory of scapular machines (fans, superchargers, compressors, turbines).</p> <p>To know: constructive device of superchargers, steam and gas turbines; thermal and strength processes in flowing parts and details of scapular machines and bases of their calculation;</p> <p>To be able: to count and choose superchargers and thermal engines</p>

	<p>depending on their appointment; to estimate profitability and reliability of superchargers and thermal engines; to carry out thermal and strength calculations of superchargers and thermal engines.</p> <p>To know: methods of definition of requirements of the enterprises in thermal and electric energy; methods of completion of losses of steam and condensate; principles of creation of thermal schemes of thermal power plant; operating modes, operation of the equipment of thermal power plant.</p> <p>To have skills: to carry out thermal calculations of thermal schemes of thermal power plant; to define expenses of fuel and energy and material resources at thermal power plant design; to choose types and characteristics of the capital and service equipment of thermal power plant.</p> <p>To be competent: in questions of operation of thermal engines of a various look and in questions of operation of thermal engines in a complex of the heat power equipment.</p>
Content	<p>Theories of scapular machines (fans, superchargers, compressors, turbines); constructive device of superchargers, steam and gas turbines; thermal and strength processes in flowing parts and details of scapular machines and bases of their calculation;</p> <p>Methods of definition of requirements of the enterprises in thermal and electric energy; methods of completion of losses of steam and condensate; principles of creation of thermal schemes of thermal power plant; operating modes, operation of the equipment of thermal power plant.</p>
Forms of final control	Examination, term project
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations, dictionaries in electronic form.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	1 Cherkassk B.M., etc. Pumps, fans,

- compressors
- 2 Cherkassk B.M., etc. Pumps, fans, compressors
 - 3 Steam and gas turbines / Edited by Kostyuk A.S. etc.
 - 4 Shcheglyayev A.V. Steam turbines
 - 5 Shcheglyayev A.V. Steam turbines. Book. 1
 - 6 Shcheglyayev A.V. Steam turbines. Book. 2
 - 7 Kirillov I.I. Automatic control of steam turbines and gas-turbine installations
 - 8 Idelchin V. N. Electric systems and networks
 - 9 Block of Century of M. Electric systems and networks
 - 10 Electric systems and networks in examples and illustrations: Studies. grant for electrical power special / Edited by Stroyev V.A.
 - 11 Bauman N. Ya. etc. Production technology of steam and gas turbines: The manual.
 - 12 Semenov A.S. Shevchenko A.M. Thermal calculation of the steam turbine: The manual

3 Modules in choice for specify specialties 5B071700 Power system

Module name	Electrical equipment and electronics
Courses of academic disciplines according to modules	Electrical equipment and electronics
Semester, in which module was learned	2
Responsible for module	Orazova G.
Working language	Russian, Kazakh
Matchingwithcurriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education lecture- 22,5 hours Practical lessons – 15, laboratory – 7,5 hours IWS - 105 hours
Assignment /workload	General quantity of hours: - 150 hours

	Among them: lecture- 22,5 hours Practical lessons – 15, laboratory – 7,5 hours IWS - 105 hours
Credits/test units	5ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Physics, Mathematics
Academic purposes/results and competences	<p>To have imagination: about modern methods of the analysis and calculation of electric chains.</p> <p>To know: methods of calculation of electric chains of direct and alternating current; methods of calculation established and transients in linear electric chains; methods of calculation of symmetric and asymmetrical modes in three-phase chains; main characteristics of electric cars of direct and alternating current; principle of action and scheme of turning on of devices and devices of industrial electronics.</p> <p>To be able: to carry out calculations of electric circuits; to determine key parameters of schemes.</p> <p>To have skills: methods of calculation of various modes in electric chains.</p> <p>To be competent: in questions of work of electric chains and electric machines.</p>
Content	Conditional graphic symbols in electric schemes, the Ohm law, Kirchhoff's law, sources of electric energy, research of linear electric chains of a direct current, a method of planimetric currents, balance of capacities, calculation of chains by a transformation method, an imposing method, property of reciprocity, entrance and mutual conductivity, the theory of compensation, measurement of alternating currents, tension and frequencies, calculation of chains of sinusoidal current of complex numbers application, research of active and jet electric chains at consecutive connection of active and jet

	elements. Emergence of transients, the switching laws, the forced, free component of transients, inclusion in a condenser and coil chain on the constant tension, a classical method of calculation of transients, Ohm and Kirchhoff laws in an operator form, an operator method, elements and equivalent schemes of the elementary nonlinear chains. Calculation of magnetic chains, variation electromagnetic field.
Forms of final control	Examination
Technical and electronic methods of education	Laboratory equipment: electronic laboratory
Literature	<p>1 . Electrical equipment and electronics: The textbook for higher education institutions. Edited by B.I.Petlenko. - M: Academy, 2003. - 230 pages.</p> <p>2 . Danilov I.A. Ivanov P. I. The general electrical equipment with electronics bases: Manual - M: High school, 2000. - 752 pages.</p> <p>3 . Pryanishnikov V. A. Electronics: Full course of lectures: corrected and additional - Teacher and pupil: CROWN print. 2003 . - 416</p> <p>4 . Lachin V. I. Electronics. - M. :High school, 2000.</p> <p>5 . Electrical equipment and electronics: Manual for the university. In 3 books, Book 3rd. Electric measurements and electronics bases. / Edited by the professor V. G. Gekrasimova. - M: Energoatom, 1998. - 432 pages.</p> <p>6 . Rekus, Belousov A. I. Collection of tasks of electrical equipment and bases of electronics: Manual for non-electrical equipment special the university. - M: High school 1991 . -416p.</p>

Module name	Mechanics of liquid and gas
Courses of academic disciplines according to modules	Mechanics of liquid and gas
Semester, in which module was	3 semester

learned	
Responsible for module	Mergalimova A.K.
Working language	Russian, Kazakh
Matching with curriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education / lecture - 30 hours Practical lessons - 15 hours, laboratory – 7,5 IWS – 127,5 hours
Assignment /workload	General quantity of hours: - 180 hours Among them: lecture - 30 hours Practical lessons - 15 hours, laboratory – 7,5 IWS – 127,5 hours
Credits/test units	6 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering the modules: Physics, chemistry
Academic purposes/results and competences	<p>As a result of module studying the student should:</p> <p>To have imagination: laws of a current of gases and liquids in channels of a various form.</p> <p>To know: methods of hydraulic and aerodynamic calculation of the heat power equipment;</p> <p>To be able: to determine hydraulic resistance at a liquid and gas current in channels, pressure losses in channels of a various form; to use methods of calculation of a stream of liquids and gases in channels, pipes, nozzles, diffuzor and other elements;</p> <p>To have skills: methods of aerodynamic and hydraulic calculation of channels of various forms</p> <p>To be competent: in development of gas flues and pipelines and a choice of superchargers.</p>
Content	Hydrostatics bases. Concept of liquid. Bernoulli, Navier-Stokes's equations. Modes of a current of liquids. Liquid current in channels various configurations. Distribution of speeds.
Forms of final control	Examination, term work

Technical and electronic methods of education	Electronic methods of education: Slide lectures, presentations, dictionaries in electronic form. Technical methods of education: screen projector, electronic board, laptop
Literature	<p>1 E. Nureken. Mechanics of liquid and gas.- Almaty: 2005, 193p</p> <p>2 A.K. KadyrbayevMechanics of liquid and gas. Manual. - Almaty: Bastau, 2008 - 270p.</p> <p>3 Altshull A.D. Hydraulics and aerodynamics: Manual for the university. M: Stroyizdat, 1987. - 410p.</p> <p>4 Kinzhibekova A.K. Ryndin V. V., Ryndina D. V. Methodical instructions to performance of laboratory works on discipline "Mechanics of liquid and gas" for students of heat power specialties. Pavlodar: PSU, 2002. - 56 pages.</p> <p>5 Deitch M. E. Zaryankin A.E. Hydraulic gas dynamics. M: Energoatom, 1984. -384 p.</p> <p>6 Ryndin V. V., Makushev Yu.P. Hydromechanics and gas dynamics: Methodical instructions to laboratory works. Almaty: EMC, 1983. - 54 p.</p> <p>7 Ryndin V. V., Ryndina D. V. Mechanics of liquid and gas (methodical instructions to a term paper for students of specialties 2201 "Thermal power plants", 2202 "Technology of water and fuel", 2204 "Industrial power system"). - Pavlodar: The Pavlodar state university named after S. Toraihyrov, 2003. - 58 p.</p>

Module name	Heat power systems and distribution of energy carriers
Courses of academic disciplines according to modules	1) Heat power systems and power use 2) Systems of production and distribution of energy carriers
Semester, in which module was learned	5 semester
Responsible for module	Talipov O.M., Orishevskaya E.V.
Working language	Russian, Kazakh
Matchingwithcurriculum	EP - Power system Obligatory component
Form of education/Number of	Day form of education

academic hours	lecture- 60 hours Practical lessons - 30 hours IWS -210 hours
Assignment /workload	General quantity of hours: - 300 hours Among them: lecture- 60 hours Practical lessons - 30 hours IWS -210 hours
Credits/test units	10ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Development of modules: theoretical bases heating engineers, mechanics of liquid and gas, physics
Academic purposes/results and competences	<p>To have imagination: about prediction and improvement of systems of production and distribution of energy carriers; application of computer technologies at design and optimization of systems of production and distribution of energy carriers.</p> <p>To know: ways of holiday of heat to consumers in couple and hot water with combined heat and power plant; methods of definition of requirements of the enterprises in warmth; principles of construction and regulation of systems of a heat supply; principles of construction and structure of heat power system of the industrial enterprise; the principles of power use in heattechnological production; appointment and main schemes of systems of a heat supply of the industrial enterprises and municipal sector.</p> <p>To be able: to count necessity for energy and heat of various heattechnological processes; to choose the capital and service equipment of sources of heat and systems of a heat supply of the industrial enterprise; to make the thermal scheme of a source of heat; to make heat power system of the industrial enterprise; to define expenses fuel - energy and material resources in installations and systems of a heat supply of industrial enterprises and the interfaced expenses in a power system of the Republic.</p> <p>To have imagination: about drawing up and the analysis of schemes and the equipment entering into their structure on settlement and off-design</p>

	<p>modes; choice and calculation of the main and service equipment of stations for production of energy carriers.</p> <p>To be competent: in development of the system of a heat supply of the industrial enterprise and a choice and a choice of the service equipment.</p>
Content	<p>Ways of leave of heat to consumers in couple and hot water with combined heat and power plant; methods of definition of requirements of the enterprises in warmth; principles of construction and regulation of systems of a heat supply; principles of construction and structure of heat power system of the industrial enterprise; the principles of power use in warmly technological production; appointment and main schemes of systems of a heat supply of the industrial enterprises and municipal sector.</p> <p>Bases of design, operation and research of systems of production and distribution of energy carriers; rational schemes of system of production and distribution of the compressed air, cold, products of division of air, fuel and water.</p>
Forms of final control	Examination, term work
Technical and electronic methods of education	Electronic methods of education: Slide lectures, presentations, dictionaries in electronic form. Technical methods of education: screen projector, electronic board, laptop
Literature	<ol style="list-style-type: none"> 1 Kopylov I.P. Electric machines. M: The high school, 2000 2 Sokolov E. Ya. Central heating and thermal networks. 3 Sterman L.S. Thermal power and autonomous plants, 2000. 4 Beloselsky B. Pages. Power fuel and lubricant oils - M: Energy, 2001 5 Dukenbayev K. D. Power industry of Kazakhstan. Conditions and mechanisms of its steady development 6 Evdokunin G. A. Electric systems and

networks: Manual for students of electrical power specialties of higher education institutions.

7 Nazmeev Yu. Konakhina I. A. Heat power systems and energy balances of the industrial enterprises. - M:publishing house, 2002

8 Serikov E. A. Theoretical bases of power system (the abstract of lectures)

9 Trukhny A.D. Bases of modern power. - M: 2002

Module name	Heat - mass- exchange
Courses of academic disciplines according to modules	Heat - mass- exchange
Semester, in which module was learned	4 semester
Responsible for module	Tulebayeva Zh.A.
Working language	Russian, Kazakh
Matchingwithcurriculum	EP - Power system Obligatory component
Form of education/Number of academic hours	Day form of education lecture- 37,5 hours Practical lessons – 7,5 hours Laboratory works-7,5 hours IWS - 127,5 hours
Assignment /workload	General quantity of hours: - 180 hours Among them: lecture- 37,5 hours Practical lessons – 7,5 hours Laboratory works-7,5 hours IWS -127,5 hours
Credits/test units	6 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: physics, chemistry, mechanics of liquid and gas
Academic purposes/results and competences	To have imagination: about the solution of problems of convective heat exchange by methods of a thermal interface, similarity of the phenomena of heat exchange, relaxation, final differences and elements of physical analogies

	<p>and modeling processes of heat exchange.</p> <p>To know: about the phenomena of transfer of an impulse, heat and weight; about solutions of the equation of heat conductivity and the simplest system of the equations of convective heat exchange in a homogeneous environment with constant heatphysical properties under various conditions of unambiguity.</p> <p>To be able: to define thermolysis coefficient at the natural and compelled movements of liquid, and also upon phase transitions; to count heat exchange by radiation and a thermolysis at difficult heat exchange; to count a heat transfer and to define thermal losses of various elements of heatexchange devices.</p> <p>To have skills: by calculation of thermal losses and a thermal condition of the heatusing equipment.</p> <p>To be competent: in questions of modeling of processes of heat exchange.</p>
Content	Types of heat exchange, heat exchange laws, heat-exchange devices, laws of thermal radiation, heat exchange during the boiling and condensation
Forms of final control	Examination
Technical and electronic methods of education	Electronic methods of education: Slide lectures, presentations, dictionaries in electronic form. Technical methods of education: screen projector, electronic board, laptop
Literature	<ol style="list-style-type: none"> 1 Heatmass exchange. Lectures / Tulebayev Zh. A. short notes. - Pavlodar: publishing house "Kereku", 2007 - 54 p. 2 Heatmass transfer: the manual for the students of the university who are learning on the direction. V. S. Shvydky, Y.G. Yaroshenko. Prod. 2nd corrected and additional - M: Academbook, 2002. - 455 p. - (The manual for the university) 3 Heatmass exchange: The manual for the university students / Island N. Bryukhanov, S. N. Shevchenko. - M: ASV publishing house, 2005. - 460 pages. 4 Temirbayev D. Zh. Heatmass exchange: The solution of tasks with COMPUTER use. -

Almaty: AIES, 2004. - 64 p.

5 Temirbayev D. Zh. Heatmass exchange: Laboratory practical work. - Almaty: AIES, 2003. - 44 p.

6 Heatmass exchange. Methodical instructions to laboratory Operation / Tulebayeva Zh.A. - Pavlodar: publishing house "Kereku", 2010 - 41 p.

Heating engineer: The manual for the university students/ Century. L.Yerofeev, P. D. Semenov, A.S. Pryakhin. - M: Academbook,

2006. _____ - 488 p.

Module name	Fuel and burning theory
Courses of academic disciplines according to modules	Fuel and burning theory
Semester, in which module was learned	4 semester
Responsible for module	Nikiphorov A.S., Karmanov A.E.
Working language	Russian, Kazakh
Matching with curriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education lectures- 30 hours Practical lessons - 22,5 hours IWS – 127,5 hours
Assignment /workload	General quantity of hours: - 180 hours Among them: lectures- 30 hours Practical lessons - 22,5 hours IWS – 127,5 hours
Credits/test units	6 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: physics, chemistry, mechanics of liquid and gas
Academic purposes/results and competences	To have imagination: about fundamental laws of chemical thermodynamics and burning kinetics; mechanisms and conditions of the spontaneous ignition steady and unstable burning; mechanisms and conditions of formation of various oxides of nitrogen when burning organic fuel.

	<p>To know: types of organic fuels, their structure and characteristics; techniques of drawing up material and thermal balances of various burning fuels process; processes of turbulent diffusion and mass transfer when burning; basic provisions of aerodynamics of furnace streams and boiling layer; methods of preparation and burning of firm fuel; methods of preparation and burning of liquid fuel; methods of preparation and burning of gaseous fuel.</p> <p>To be able: to carry out calculations of characteristics of mixes of various fuels; to make thermal and material balances of burning processes for all types of fuel; to determine by a settlement way of temperature of burning; to carry out calculations of amount of air (including enriched with oxygen), the set fuel necessary for burning, and volumes of the combustion gases which were formed thus; to make schemes of fuel facility for each type of fuel; to count and choose the necessary equipment for fuel facility.</p> <p>To have skills: by calculations of burning of fuels and material balances of processes of burning.</p> <p>To be competent: in questions of a choice of schemes of preparation and burning of different types of fuel.</p>
Content	Types of organic fuels, their structure and characteristics; techniques of drawing up material and thermal balances of various burning fuels process; fundamental laws of chemical thermodynamics and burning kinetics; mechanism and conditions of the spontaneous ignition steady and unstable burning; mechanisms and conditions of various oxides of nitrogen formation when burning organic fuel; processes of turbulent diffusion and mass transfer when burning; basic provisions of aerodynamics of furnace streams and boiling layer; methods of preparation and burning of firm fuel; methods of preparation and burning of liquid fuel; methods of preparation and burning of gaseous fuel.
Forms of final control	Examination, term work
Technical and electronic	Electronic methods of education: Slide lectures,

methods of education	presentations, dictionaries in electronic form. Technical methods of education: screen projector, electronic board, laptop
Literature	1 Khzmalyan D. M., Kagan Ya. A. Theory of burning and furnace devices / Khzmalyan D. M. - M.: Energy, 1976.- 488p.

Module name	Bases of preparation of water
Courses of academic disciplines according to modules	Physical and chemical methods of a preparation of water on thermal power plants and the industrial enterprises
Semester, in which module was learned	4 semester
Responsible for module	Azamatova D.A., Karmanov A.E.
Working language	Russian, Kazakh
Matching with curriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education lectures- 30 hours Practical lessons – 22,5 hours IWS – 127,5 hours
Assignment /workload	General quantity of hours: - 180 hours Among them: lectures- 30 hours Practical lessons – 22,5 hours IWS – 127,5 hours
Credits/test units	6 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: physics, chemistry, mechanics of liquid and gas
Academic purposes/results and competences	<p>To have imagination: about the main methods of preliminary water purification; technologies of an ionic exchange; technologies of processing of highly mineralized waters and solutions; technologies of removal of gases.</p> <p>To know: characteristics of impurity and main indicators of quality of water; technologies of processing of cooling water; technologies of neutralization of sewage; thermal water treatment.</p> <p>To be able: to count key parameters of separate stages of processing an oxen; to count intensity of education adjournment and the speed of korroktionny processes; to design systems of</p>

	<p>preparation of water taking into account basic data and qualifying standards.</p> <p>To have skills: at a choice and calculations of schemes of preparation of water and neutralization of sewage.</p> <p>To be competent: in questions modern power - and resource-saving technologies on water purification.</p>
Content	<p>Characteristics of impurity and main indicators of quality of water; main methods of preliminary water purification; technology of an ionic exchange; technologies of processing of highly mineralized waters and solutions; technologies of removal of gases; technologies of processing of cooling water; technologies of neutralization of sewage; thermal water treatment.</p>
Forms of final control	Examination
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	<p>1 . Glazyrin A. I. Muzyka L.P. Kabdualiyev M. M. Power system station and preparation of water for industry: The manual - Almaty. : RBC, 2001. - 150.</p> <p>2 Glazyrin A. And. L.P music. Kabdualiyev M. M. Power system station and preparation of water for industry: The manual - Almaty. : RBC, 1997. - 150.</p> <p>3 . Kostrikin YU.M. Meshchersky N.A., Korovin O. V. Water treatment and water mode of power objects of low and average pressure. Reference. M: Energoatomizdat, 1990. - 252 p.</p> <p>4 . Thermal and nuclear power plants: The directory / Under the general editorship of V.A.Grigoriev and V. M. Zorin. - M: Energoizdat, 1989. - 603 p.</p> <p>5 Water treatment: Reference. / Edited by S.E. Belikov. M: Aqua Term, 2007. - 240 p.</p> <p>6 E.P. Guzhulev, B.B. of Shalay, V.I.Gritsenko, M.A.Taran. Water treatment and introduction and chemical modes in power system: Omsk: Publishing house of OSTU, 2005. - 384 p.</p>

Module name	Bases of preparation of fuel
Courses of academic disciplines according to modules	Technology of preparation of fuel
Semester, in which module was learned	6 semester
Responsible for module	Nikiphorov A.S., Karmanov A.E.
Working language	Russian, Kazakh
Matching with curriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education lectures- 37,5 hours Practical lessons - 7,5 hours Laboratory works-7,5 hours IWS – 127,5 hours
Assignment /workload	General quantity of hours: - 180 hours Among them: lectures- 37,5 hours Practical lessons - 7,5 hours Laboratory works-7,5 hours IWS – 127,5 hours
Credits/test units	6 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: physics, chemistry, boiler installations and steam generators, fuel and burning theory
Academic purposes/results and competences	<p>To have imagination: about techniques of definition of technological indicators of fuel quality; methods of preparation, transportation and burning of organic fuels in furnace devices.</p> <p>To know: operating modes of the equipment and systems of fuel preparation and dependence of technical and economic indicators on regime parameters; methods of carrying out industrial tests of processing equipment of systems of preparation of fuel; achievements of science and technology, best practices in area of technology of fuel.</p> <p>To be able: to determine parameters and to prepare the specification on design of system of preparation of fuel; to prepare project documentation on reconstruction of existing installation of preparation of fuel.</p> <p>To have skills: at a choice and calculations of schemes of preparation of fuel of different types.</p>

	To be competent: in questions of design modern power - and resource-saving technologies on fuel preparation on thermal power plant and software.
Content	Definition of technological indicators of quality of fuel; preparation and transportation methods and burning of organic fuels in furnace devices; operating modes of the equipment and systems of preparation of fuel and dependence of technical and economic indicators on performance parameters; methods of carrying out industrial tests of processing equipment of systems of preparation of fuel; achievements of science and technology, best practices in area of technology of fuel.
Forms of final control	Examination
Technical and electronic methods of education	Electronic methods of education: Slide lectures, presentations. Technical methods of education: screen projector, electronic board, laptop
Literature	<ol style="list-style-type: none"> 1 Levit G.T. Pulverization on thermal power plants 2 Gavrilov E.I. oil-transport economy and a waste removal on thermal power plant: The manual 3 Richter L.A. etc. Protection of the water and air pool from emissions of thermal power plants: The manual for the university. 4 Beloselsky B.S. Heating fuel oil. - M: Energy, 1978 5 Beloselbsky B.S., Low-grade power oil: peculiarity of preparation and burning. - M: Energy, 1989 6 Antonyants G.R. Fuel and transport economy of thermal power plants. - M: Energy, 1977

Module name	Engineering and computer graphics
Courses of academic disciplines according to modules	Engineering and computer graphics
Semester, in which module was learned	5 semester
Responsible for module	Shkreba E.V.
Working language	Russian, Kazakh
Matching with curriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education lectures- 22,5 hours Practical lessons - 15 hours Laboratory works-7,5 hours IWS - 105 hours
Assignment /workload	General quantity of hours: - 150 hours Among them: lectures- 22,5 hours Practical lessons - 15 hours Laboratory works-7,5 hours IWS - 105 hours
Credits/test units	5 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: physics, mathematics 1,2
Academic purposes/results and competences	To have imagination: about work of the main computer programs on creation of technical drawings. To know: bases of creation of images of geometrical models of space, ways of the

	<p>solution of technical tasks graphic way and requirements of standards to implementation of drawings and schemes.</p> <p>To be able: to determine geometrical forms of simple details and assembly units by their images; to have skills of implementation of drawings and schemes, including use of computer graphics.</p> <p>To have skills: on performance of assembly drawings in electronic form.</p> <p>To be competent: in questions of the standard demands made to drawings.</p>
Content	Bases of creation of images of geometrical models of space, ways of the solution of technical tasks graphic way and requirements of standards to implementation of drawings and schemes.
Forms of final control	Examination
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	<p>1 Brodsky A.M. etc. Engineering graphics. (Metal working): Manual. / Brodsky A.M. Fazlulin E.M. Khaldinov V.A. - Academy, 2003</p> <p>2 Vlasov M.P. Engineering graphics: manual engineering-technical specialties of the university. - .:mechanic engineering, 1979</p> <p>3 Engineering and computer graphics: Method. instructions to performance graphical works on the subject "Creation of Images" for students energetical specialties of day form education/A.A.Statsenko, E.V.Shkreba - Pavlodar:PSU of S. Toraighyrov, 2003</p> <p>4 Computer project. - 2001 Medvedev N. I. The decision metric and position exercises: method of instruction on discipline</p> <p>5 "The descriptive geometry and engineering graphics" for individual and independent work of students engineering builds. special (for the university usings).- Pavlodar:PSU of S. Toraighyrov, 2003</p>

Module name	Central heating and thermal networks
Courses of academic disciplines according to modules	Central heating and thermal networks
Semester, in which module was learned	5 semester
Responsible for module	Orishevskaya E.V., Berguzinov A.N.
Working language	Russian, Kazakh
Matching with curriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education / lectures- 30 hours Practical lessons - 15 hours IWS - 105 hours
Assignment /workload	General quantity of hours: - 150 hours Among them: lectures- 30 hours Practical lessons - 15 hours IWS - 105 hours
Credits/test units	5ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: physics, mathematics 1,2, chemistry, mechanics of liquid and gas, heat-mass-exchange
Academic purposes/results and competences	<p>To have imagination: about the main schemes of functioning of systems of a heat supply of the industrial enterprises.</p> <p>To know: methods of definition of requirements of the enterprises in warmth; implementation of technological and sanitary processes; principles of construction and regulation of systems of a heat supply; rules of technical operation of installations and systems of a heat supply industrial enterprise.</p> <p>To be able: to carry out technical calculations of heat power installations and their equipment, using modern mathematical methods in the computer; to define expenses of fuel and energy and material resources in installations and systems of a heat supply of industrial enterprises and the interfaced expenses in a power system of the republic; to choose characteristics of heat carriers of systems of a</p>

	<p>heat supply of the enterprises.</p> <p>To have skills: by definition of requirements of the enterprises in warmth, to creation of schedules of thermal loading.</p> <p>To be competent: in development of the system of a heat supply of the industrial enterprise and a thermal network for heat carrier giving.</p>
Content	<p>Definition of requirements of the enterprises in warmth; implementation of technological and sanitary processes; principles of construction and regulation of systems of a heat supply; rules of technical operation of installations and systems of a heat supply industrial enterprise.</p>
Forms of final control	Examination
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	<p>1 Heat supply: The manual for the university / A.A.Ionin, B.M.Khlybov, V.N.Bratenkov, E.N.Terletskaia; Under the editorship of A.A.Ionin. - M.:Stroyizdat, 1982.</p> <p>2 Heat supply: The manual for the university on special "Heat gas supply and ventilation" / V.E.Kozin, T.A.Levina, A.P.Markov, etc. - M.:High school, 1980</p>

Module name	Heat technical measurements and control
Courses of academic disciplines according to modules	Heat technical measurements and control
Semester, in which module was learned	3 semester
Responsible for module	AzamatovaD.A.
Working language	Russian, Kazakh
Matchingwithcurriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education Lectures - 30 hours Practical lessons – 7,5 hours Laboratory works-7,5 hours IWS - 105 hours
Assignment /workload	General quantity of hours: - 150 hours Among them: lectures- 30 hours

	Practical lessons – 7,5 hours Laboratory works-7,5 hours IWS - 105 hours
Credits/test units	5 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: Physics, Mathematics 1,2
Academic purposes/results and competences	<p>To have imagination: about measurement methods, organization of measurement of temperature, pressure, expense and amount of liquid, heat, composition of gas, humidity of gases and firm bodies; to check of gages and assessment of an error of measurements.</p> <p>To know: theoretical bases of metrology, its value in science, equipment and in development of new technologies in modern conditions; the main concepts connected with objects and measuring instruments; regularities of formation of result of measurement, concept of an error, sources of errors; legal bases of ensuring unity of measurements; ecological indicators of work of heat power objects; the main concepts about quality of the electric power, thermal energy, production, raw materials and fuel.</p> <p>To be able: independently prove and choose a gage for the solution of a measuring task; to apply computer technologies to collecting and information processing on heattechnical measurements</p> <p>To have skills: on drawing up schemes of automation and management of thermal schemes.</p> <p>To be competent: in questions of modern devices and the devices applied to automation of thermal schemes.</p>
Content	Theoretical bases of metrology, its value in science, equipment and in development of new technologies in modern conditions; the main concepts connected with objects and measuring instruments; regularities of formation of result of measurement, concept of an error, sources of errors; legal bases of ensuring unity of

	measurements; measurement methods, organization of measurement of temperature, pressure, expense and amount of liquid, heat, composition of gas, humidity of gases and firm bodies; check of gages and assessment of an error of measurements;
Forms of final control	Examination
Technical and electronic methods of education	Electronic methods of education: Slide lectures, presentations. Technical methods of education: screen projector, electronic board, laptop
Literature	1 Preobrazhenskiy V.P. Heattechnical measurements and devices 2 Ivanovs G. M., Kuznetsova N. D., Chistyakov I.S. Heattechnical measurements and devices 3 Chistyakov of S.F. Radun D. V. Heattechnical measurements and devices 4 Chistyakov S.F. Kuznetsov N. D., Chistyakov V. S. The collection of tasks and questions on heattechnical measurements and devices 5 Pancakes of O.M., etc. Heattechnical measurements and devices: The manual for the university

Module name	Bases of technological control
Courses of academic disciplines according to modules	Bases of technological control of thermal processes
Semester, in which module was learned	7 semester
Responsible for module	AzamatovaD.A.
Working language	Russian, Kazakh
Matchingwithcurriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education lectures- 30 hours Practical lessons - 15 hours IWS - 105 hours
Assignment /workload	General quantity of hours: - 150 hours Among them: lectures- 30 hours Practical lessons - 15 hours IWS - 105 hours
Credits/test units	5ECTS
Requirements, according to	FSA PSU 8.01.2-09 «Control and assessment of

examination procedure	academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: physics, mathematics 1,2, Heattechnical measurements and control
Academic purposes/results and competences	<p>To have imagination: about methods of an analytical and pilot study of static and dynamic characteristics of objects of management.</p> <p>To know: methods of drawing up and linearization of mathematical models of dynamic systems; methods of the analysis of stability of dynamic systems, methods of the analysis of quality of transients in control systems; methods and instruments of imitating modeling and analysis of control systems.</p> <p>To be able: to describe dynamic system by means of block diagrams and alarm counts, to transform and simplify block diagrams, to model and investigate dynamic system with use of analog and digital computer facilities; to analyze stability and quality indicators of work of system of automatic control; to synthesize system of demanded quality.</p> <p>To have skills: on research of analytical and experimental static and dynamic characteristics of objects of management.</p> <p>To be competent: in modeling and research of dynamic systems with use of analog and digital computer facilities.</p>
Content	Methods of an analytical and experimental research of static and dynamic characteristics of management objects; methods of drawing up and linearization of mathematical models of dynamic systems; methods of the analysis of stability of dynamic systems, methods of the analysis of quality of transient phenomena in control systems; methods and tools of a simulation modeling and analysis of control systems.
Forms of final control	Examination
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	1 Electronic educational course according to the theory automatic Management / Pfeyfer

N.E., Nurbekova Zh.K. Asainova A.Zh. Dautova of A.Z, Glazyrin S. A. Tulebayeva Zh.A. Podsadnaya S.A., Toksanov S. N., Nosov A.A. Grechishkina T.Yu. - Pavlodar, PSU named after S. Toraihyrov, 2009, - 116 p.

2 Rotach V.Ya. Theory of automatic control. - M: MEI, 2004. - 400c.

3 Pletnev G. P. Automation of technological processes and productions. - M: 2005. - 352 p.

4 Dorf R. Bishop R. The modern control systems: - M: Laboratory of Basic Knowledge, 2002, - 832 p. ___

Module name	Water and chemical modes and corrosion
Courses of academic disciplines according to modules	Corrosion and preservation of power inventory Water and chemical modes and corrosion
Semester, in which module was learned	6 semester
Responsible for module	Glazyrin A.I., Azamatova D.A.
Working language	Russian, Kazakh
Matching with curriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education lectures- 60 hours Practical lessons - 45 hours IWS - 255 hours
Assignment /workload	General quantity of hours: - 360 hours Among them: lectures- 60 hours Practical lessons - 45 hours IWS - 255 hours
Credits/test units	12 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: Mathematics, Physics, Chemistry.
Academic purposes/results and competences	To have imagination: about bases of corrosion of inventory and protection it from corrosion during operation and at idle time it under repair and a reserve. To know: bases of inventory corrosion and its protection from corrosion during operation. To be able: to apply the received theoretical knowledge at realization of technological

	<p>calculations of separate processes and devices, to be able to use practically this knowledge at inventory operation.</p> <p>To know: bases of technology of preparation of water heat carrier for use in contours of heat power and promheatetechnical inventory of the enterprises; bases of maintaining a water and chemical mode; bases of corrosion of inventory and protection it from corrosion during operation. To have skills: maintaining water and chemical modes on various inventory.</p> <p>To be competent: in questions of theoretical knowledge of maintaining water and chemical modes in practice.</p>
Content	<p>Bases of corrosion of inventory and protection it from corrosion during operation and at idle time it under repair and a reserve.</p> <p>Bases of technology of preparation of water heat carrier for use in contours of heat power and promheatetechnical inventory of the enterprises; bases of maintaining a water and chemical mode; bases of corrosion of inventory and protection it from corrosion during operation.</p>
Forms of final control	Examination
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	<ol style="list-style-type: none"> 1 Vaynman A. B. Prevention of corrosion of drum coppers of high pressure. - M.:Energyatomizdat, 1985 2 Glazyrin A. I. revention of corrosion of drum coppers of high pressure: The manual for the university /A.I.Glazyryn, L.P.Muzyka, M M Kabdualiyeva. - Pavlodar, 2001 3 Glazyrin A.I. etc. Water and chemical modes of thermal power plants and boiler production enterprises: The manual / A.I.Glazyrin, L.P.Muzyka, M.M.Kabdualiyev. - Almaty: 1994 4 Yovchev M. Corrosion heat power and nuclear energy inventory/ Edited by P.A.Akolzin. - M., 1988

	5 Methodical software developments to a subject: "Corrosion of inventory and methods of its prevention", to the course "Boiler Installations of the Production Enterprises": For the university use / A.I.Glazyrin. - Pavlodar, 1984
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Module name	Operation of the capital and accessory equipment of thermal power plant / Operation of the capital and accessory equipment of software
Courses of academic disciplines according to modules	Combustion tube of the device
Semester, in which module was learned	6
Responsible for module	
Working language	Russian, Kazakh
Matching with curriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education lectures- 30 hours Practical lessons - 15 hours IWS - 105 hours
Assignment /workload	General quantity of hours: - 150 hours Among them: lectures- 30 hours Practical lessons - 15 hours IWS - 105 hours
Credits/test units	5ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: boiler installations and steam generators, fuel and combustion theory
Academic purposes/results and competences	To have imagination: about operation of boiler installations, a start-up order, break and upkeeps of coppers in operating time. To know: the antiemergency provisions and violations of profitability of work and action thus, paths of an exception of pollution of the environment, action at accidents and accidents, fire-prevention actions. To be able: to let, stop and serve boiler installations in operating time, to recognize

	<p>violations in work, to exclude environment, to work in the emergency cases and at a personnel traumatizing, to liquidate a fire.</p> <p>To have skills: operation of boiler installations, a start-up order, break and upkeeps in operating time.</p> <p>To be competent: in questions of the solution of the contingency situations arising at operation of boiler installations; in questions of the solution of the contingency situations arising at operation of turbine installations; in questions of the solution of the contingency situations arising at operation of steam installations.</p>
Content	<p>Operation of boiler installations, start-up order, break and upkeeps in operating time, the antiemergency provisions and violations of profitability of work and action thus, paths of an exception of environmental, action at accidents and accidents, fire-prevention actions. Classification and main heatprincipal specifications of furnace and stream devices; flow diagram of combustion gaseous, fluid and solid fuels.</p>
Forms of final control	Examination
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	<p>1 Theory of automatic control. - Part one. Under the editorship of A.A.Voronova. M: High school, 1986.</p> <p>2 Methods of the classical and modern theory of automatic control: The manual in 5 volumes / Under the editorship of K.A.Pupkova, N. D. Egupova. - M: MSTU publishing house of N.E. Bauman. 2004 . - 656 p.</p> <p>3 Ostrem K. Vittenmark B. Control systems with EVM Systems/translation from English - M: World, 1987. - 480 p.</p> <p>4 Dorf P, Bishop R. The modern control systems/translation from English - M: Laboratory of Basic Knowledge, 2002. - 832 p.</p>

Module name

Environmental protection at operation of

	heat power inventory
Courses of academic disciplines according to modules	Environmental protection at operation of heat power inventory
Semester, in which module was learned	6 semester
Responsible for module	Orishevskaya E. V., Azamatova D.A.
Working language	Russian, Kazakh
Matching with curriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education lectures- 30 hours Practical lessons - 15 hours IWS - 105 hours
Assignment /workload	General quantity of hours: - 150 hours Among them: lectures- 30 hours Practical lessons - 15 hours IWS - 105 hours
Credits/test units	5ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: boiler installations and steam generators, fuel and combustion theory, Operation of the capital and accessory equipment
Academic purposes/results and competences	<p>To have imagination: about technology and schemes of purification of tail waters and gases from harmful impurity, legislative base of ecological policy of RK.</p> <p>To know: methods of decrease in harmful impurity modes at operation of heat power inventory, ecological rationing of harmful emissions.</p> <p>To be able: to apply the received knowledge at an assessment of effectiveness of actions for protection of the water and air pool, to determine the sizes of protective zones, to consider standards of quality of a surrounding medium at projection and operation of heat supply facilities and water handling, to develop efficient ways of suppression of formation of harmful substances and methods of cleaning of emissions of the production enterprises.</p> <p>To have skills: calculations of emissions of harmful substances at combustion of different</p>

	<p>types of organic fuel.</p> <p>To be competent: in a choice of schemes of decrease harmful emissions on thermal power plant and software.</p>
Content	<p>Methods of decrease in harmful impurity modes at operation of heat power inventory, technology and schemes of purification of tail waters and gases from harmful impurity, legislative base of ecological policy of RK, ecological rationing of harmful emissions.</p>
Forms of final control	Examination
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	<ol style="list-style-type: none"> 1 Fedorov A.I., Nikolsky A.N. Practice on ecology and protection environment: the manual. 2 The manual "Ecology"/ Edited by Bogolyubov S. A. 3 Sagimbayev G. K. Ecology and economy 4 Segal I.Ya. Protection of the air pool at fuel combustion 5 Ecology: The manual / Edited by Bogolyubov S. A. 6 Tishchenko N. F. Protection of free air: manual 7 Tonkopy M.S.. Economic assessment of water resources and damages from pollution of the air environment. Manual 8 Akimova T.A. Haskin V. V. Ecology: Manual 9 Akimova T.A. Haskin V. V. Ecology: Manual 10 Richter L.A. Thermal power plants and protection of the atmosphere 11 Masur I.I. Moldavanov O. I. Course of engineering ecology, Pirumov A.I. 12 Richter L.A. E.P.Pokrovsky Protection of water and air pools from

thermal power plant emissions

Module name	Operation of turbine inventory of thermal power plant / Operation of turbine inventory of software
Courses of academic disciplines according to modules	Operation of turbine inventory of thermal power plant
Semester, in which module was learned	7 semester
Responsible for module	Talipov O.M.
Working language	Russian, Kazakh
Matching with curriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education lectures- 30 hours Practical lessons - 15 hours IWS - 105 hours
Assignment /workload	General quantity of hours: - 150 hours Among them: lectures- 30 hours Practical lessons - 15 hours IWS - 105 hours
Credits/test units	5 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: thermal engines, theoretical bases heating engineers
Academic purposes/results and competences	As a result of module studying the student should: To have imagination: about maneuverable opportunities of inventory of thermal power plant; features of operation of power units KES; features of operation of inventory of combined heat and power plant. To know: start-stopping modes of inventory of thermal power plant; modes of operation of systems of a heat supply. To be able: to solve problems on passing of minimum loadings by thermal power plant inventory; to solve optimizing problems of distribution of loadings between in parallel working inventory of thermal power plant; to

	<p>define expenses of fuel and energy and material resources in installations and systems of a heat supply of industrial enterprises.</p> <p>To have skills: solutions of the nonstandard situations arising during the work of turbine inventory of software.</p> <p>To be competent: in a choice of an optimum duty of turbine inventory of thermal power plant; in a choice of an optimum duty of turbine inventory of software.</p>
Content	<p>Operation of turbine inventory, start-up order, охранова and upkeeps in operating time, the antiemergency provisions and violations of profitability of work and action thus, paths of an exception of pollution of the environment, action at accidents and accidents, fire-prevention actions. features of operation of power units KES; features of operation of inventory of combined heat and power plant; pusko-stopping modes of inventory of thermal power plant</p>
Forms of final control	Examination
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	<p>Denisov B. N., etc. Turbine installations and operation a turbin:the manual for mechanic engineering /B.N. Denisov, V. G. Popkov, Yu.G.Yashchenko. - M.:mechanic engineering, 1971.</p> <p>2 Zanin A.I. Sokolov V. S. Steam turbines.:the manual- Zanin A.I. technical training college falcons - M.:High school, 1988</p> <p>3 Kirillov I.I. Automatic control of steam turbines and gas-turbine installation:The manual for the university - the 2nd prod. reslave. and additional - L.: mechanic engineering, 1988</p> <p>4 Steam and gas turbines:the manual/Arsenyev L. etc.; Edited by Cantor S.- mechanic engineering, 1970</p>

	<p>5 Steam and gas turbines: collection of tasks. The manual / Edited by Troyanovsky B., Samoylovich G. - the 3rd prod. - M.:Energiya, 1987</p> <p>6 Revzin B. S., Larionov I.D. Gas-turbine installations with superchargers for transport the gas: the manual. - M., 1991</p> <p>7 Shlyakhin P. N., Bershadsky M. L. The short directory on turbine installations / Shlyakhin of P.N., Bershadsky M.L. - the 2nd prod. additional - M.:energy, 1970</p> <p>8 Shlyakhin P. N. Steam and gas a turbiny:the manual for technical schools / Shlyakhin of PN. - the 2nd prod. reworks and additional - M:energy, 1974</p> <p>9 Plotkin E.R. Leyzerovich A.SH. Starting modes of steam turbines of power units. - M:energy, 1980</p>
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Module name	Energy saving in Power system and the heating engineer
Courses of academic disciplines according to modules	Energy saving in Power system and the heating engineer
Semester, in which module was learned	7semester
Responsible for module	Orishevskaya E. V.
Working language	Russian
Matchingwithcurriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education lectures- 30 hours Practical lessons - 15 hours IWS – 105 hours
Assignment /workload	General quantity of hours: - 150 hours Among them: lectures- 30 hours Practical lessons - 15 hours IWS – 105 hours
Credits/test units	5ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: Heat power systems and distribution of power supplies, Boiler installations and steam generators
Academic purposes/results and	To have imagination: about a condition,

competences	<p>problems and the direction of development of energy saving in the world and Kazakhstan now and in the long term; principles of a state policy of energy saving.</p> <p>To know: main concepts and energy saving terms; method of the limiting energy saving; the directions and energy saving scales in industries; the modern methods and devices of monitoring and accounting of power supplies; directions and scales of use of nonconventional renewables.</p> <p>To be able: to make and analyze fuel and energy balances production the enterprise; to estimate effectiveness of power using in industries; to count power losses of heattechnological installations and systems; to count heli- and bio-engine installations; to develop energy saving actions.</p> <p>To have skills: choice of duties of inventory for functioning of all scheme of work in an energy saving mode.</p> <p>To be competent: in a choice of the modern inventory answering to optimum energy efficiency.</p>
Content	<p>Problems and the directions of energy saving development in the world and Kazakhstan now and in the long term; principles of a state policy of energy saving; main concepts and energy saving terms; method of the limiting energy saving; the directions and energy saving scales in industries; the modern methods and devices of monitoring and accounting of power supplies; directions and scales of use of nonconventional renewables.</p>
Forms of final control	Examination
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	<p>1 Salnikov A.Kh., Shevchenko L.A. Rationing of consumption and economy of fuel and energy resources. - M.:Energyatomizdat, 1986</p>

- 2 Salnikov V.G. Economy of electric energy in industry. - Almaty: Kazakhstan, 1984.-124p.
- 3 Salnikov V.G., etc. Economy of electric energy in industry/M.A.Suyerkulov. G.V.Salnikov. - Frunze: Kyrgyzstan, 198-75 p.
- 4 Rei D. Economy of electric energy in industry: The manual for engineering - technical workers / with translation from English, edited by Arakelova V. E. - M., 1983 . -208p. (Economy of fuel and electric power)
- 5 Energy saving technology of power supply national farms: In 5 books / Edited by V.A.Venikova. - M.:High school. Book 1:
Decrease in a technological power consumption in electric networks / D.A.Arzamastsev, A.V.Lipes. -1989 - 124p.
- 6 Energy saving technology of power supply national farms: In 5 books / Edited by V.A.Venikova. - M.:High school. Book 2:
Energy saving in the electric drive/N F. Ilyinsky, etc.-1989. - 124p
- 7 Energy saving technology of power supply national farms: In 5 books / Edited by V.A.Venikova. - M.:High school. Book 3:
Reliability and effectiveness of networks of electric systems / Yu.A. Fokin. 1989 . - 150p.
- 8 Energy saving technology of power supply national farms: In 5 books / Edited by V.A.Venikova. - M.:High school. Book 4:
Consumption of electric energy - reliability and modes / Century of Century. Mikhaylov, M.A.Polyakov. -1989. - 143p.

Module name	Educational research work of students
Courses of academic disciplines according to modules	Educational research work of students
Semester, in which module was learned	7 semester
Responsible for module	Talipov O.M.
Working language	Russian, Kazakh
Matching with curriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education Practical lessons - 45 hours IWS - 105 hours
Assignment /workload	General quantity of hours: - 150 hours Practical lessons - 45 hours IWS - 105 hours
Credits/test units	5ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: module of measuring technologies, module of bases of automation, mathematics module.
Academic purposes/results and competences	To have imagination: about the main methods of theoretical research; model operation in scientific research. To know: technique and measuring technique; planning and analysis of observed data; statistical methods in scientific research; registration of results of research. To be able: competently put a problem; to study materials of researches; to plan experiment; it is correct to make out results of research. To have skills: self-contained problem definition research and experiment. To be competent: analysis of observed data and registration of scientific development.
Content	Main methods of theoretical research; model operation in scientific research; technique and measuring technique; planning and analysis of observed data; statistical methods in scientific research; registration of results of research. To be competent: analysis of observed data

	and registration of scientific development.
Forms of final control	Examination
Technical and electronic methods of education	Electronic methods of education: Slide lectures, presentations. Technical methods of education: screen projector, electronic board, laptop
Literature	<ol style="list-style-type: none"> 1. 1 . Theory and technique of thermal experiment. / Edited by Schukina V. K. - M: Energyatomizdat, 1985. -360 pages. 2. 1 Schenk H. Theory of engineering experiment. - M: World, 1972. - 387 pages. 3. 2 Kolenko E.A. Technology of laboratory experiment. - M : Polytechnique, 1994. - 450 pages. 4. 4 . Zakin YA.KH. Rashidov N. R. Bases of scientific research. - Tashkent: Ukutuvchi, 1981. - 208 pages. 5. 5 . Grandsons A.K. Experimental works on steam generators - M: Energy, 1973-319s. 6 . Sukhorukov V. I. Scientific bases of perfecting of technique and coke production technology. - Yekaterinburg. 1999 - 309 pages.

Module name	Industry branch economy
Courses of academic disciplines according to modules	Industry branch economy
Semester, in which module was learned	7semester
Responsible for module	BoikoG.F., Sultanbekov S.S.
Working language	Russian, Kazakh
Matching with curriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education Lectures - 30 hours Practical lessons - 15 hours IWS - 105 hours
Assignment /workload	General quantity of hours: - 150 hours Among them: Lectures - 30 hours Practical lessons - 15 hours IWS - 105 hours
Credits/test units	5ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of

	students »
Conditions of education reception according to modules	Mastering of modules: Economical and legal bases, mathematician 1,2
Academic purposes/results and competences	<p>To have imagination: about a choice of sources of financing at implementation of the project; to use packages of applied programs for realization of heat power calculations; technical solution.</p> <p>To know: about market transformations to branches; about used methods of expenses charge; about calculation of a tariff for services of the power enterprises; about the accounting standards used in RK.</p> <p>To be able: to count efficiency factors of technical solutions; to choose an optimum candidate solution of a specific technical objective, to estimate its accuracy and reliability; to count work and production efficiency factors; to carry out technical and economic calculations for definition of expenses for energy production and to calculation of prime cost of unit of power production; to make the business plan according to the energetic project.</p> <p>To have skills: calculation of optimum option of economic efficiency of proposed technical solutions.</p> <p>To be competent: the analysis of received economic efficiency when comparing various technical solutions.</p>
Content	Market transformations to branches; about used methods of charge of expenses; about calculation of a tariff for services of the power enterprises; about the accounting standards used in RK.
Forms of final control	Examination, term work
Technical and electronic methods of education	<p>Electronic methods of education: Slide lectures, presentations.</p> <p>Technical methods of education: screen projector, electronic board, laptop</p>
Literature	1 Enterprise economy: the manual for the university/ Edited by E.L.Kantor. - SPb.:piter, 2002. - 351c. - (Manuals for the university)

2 Economy of the enterprise and business [Electronic resource]: Electronic book. - Karaganda:KarSU, 2003

3 Samsonov, V.S. Industry economy power complex: Manual for the student of specialties of "Management"/V.S.Samsonov, M.A.Vyatkin. - Prod. the 2nd. M.:high school, 2003
Chernukhin A. A. Flakserman Yu. N.

4 Economy of a power engineering of the USSR: Manuals for students of energetic specialties

5 Dukenbayev K. Power engineering of Kazakhstan: Action to the market 6 Industry branch economy and management of industry: Indications of examination for the students of power system specialties, correspondence form of tutoring / Quickly F. - Pavlodar:PSU named after S. Toraighyrova, 2004

3 Additional educational services

Module name	Physical culture
Courses of academic disciplines according to modules	Physical culture
Semester, in which module was learned	1, 2, 3, 4
Responsible for module	
Working language	Russian, Kazakh
Matching with curriculum	EP- Power system In choice component
Form of education/Number of academic hours	Day form of education Lectures- 15 hours Practical lessons -52,5 hours IWS - 97,5 hours
Assignment /workload	General quantity of hours: - 135 hours Among them: Lectures - 15 hours Practical lessons - 52,5 hours IWS - 97,5 hours
Credits/test units	12 ECTS

Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules
Academic purposes/results and competences	<p>To have imagination: about bases of the theory and physical culture and sport technique; features of reactions of an organism on various modes of physical activity and serviceability.</p> <p>To know: the most significant psychophysical and functional indexes influencing professional activity and the main forms, ways and methods of their regulation; hygienic bases of management of health; bases of a healthy lifestyle of the student; prophylaxis of occupational diseases; systems of naturally-scientific, psychology-pedagogical, express knowledge of physical culture, and also formations of knowledge and abilities on self-checking.</p> <p>To be able: to use tools and physical culture and sport methods for supporting the specialties, professional serviceability, health and prophylaxis of occupational diseases; to plan, supervise and operate physical and functional readiness; to make complexes of morning hygienic exercises; to hold testing of a level of development of the main physical qualities and to estimate physical readiness; to organize and hold competitions on main types of sports, to be able to judge them; to develop complexes of the exercises aimed at the development of particular physical quality (on the instructions of the teacher); to make the individual program of improvement of an organism.</p> <p>To have skills: applications of methods of physical culture for maintaining of express, professional serviceability.</p> <p>To be competent: theories and physical culture and sport techniques; features of reactions of an organism on various modes</p>

	of an exercise stress.
Content	Bases of the theory and physical culture and sport technique; features of reactions of an organism on various modes of physical activity and serviceability; the most significant psychophysical and functional indexes influencing professional activity and the main forms, ways and methods of their regulation; hygienic bases of management of health; bases of a healthy lifestyle of the student; prophylaxis of occupational diseases; systems of naturally scientific, psikhologo-pedagogical, express knowledge of physical culture, and also formations of knowledge and abilities on self-checking.
Forms of final control	Examination, term work
Technical and electronic methods of education	Electronic methods of education: Slide lectures, presentations. Technical methods of education: screen projector, electronic board, laptop
Literature	

Module name	Module of practices
Courses of academic disciplines according to modules	Educational, production, predegree practitioners
Semester, in which module was learned	2, 4, 6, 8
Responsible for module	Karmanov A.E.
Working language	Russian, Kazakh
Matching with curriculum	EP- Power system Obligatory component 2, 4, 6, 8 semesters
Form of education/Number of academic hours	Day form of education
Assignment /workload	16 weeks
Credits/test units	48 ECTS
Requirements, according to examination procedure	
Conditions of education reception according to modules	
Academic purposes/results and competences	The student when passing practice should: - completely to execute the practice program, to

	<p>keep the practice diary in the form established by a higher educational institution;</p> <ul style="list-style-type: none"> - to submit to the regulations existing on the corresponding base of practice; - to study and strictly to keep rules of labor protection, the accident prevention and production sanitation; <p>- to deliver to the head of practice in the established form the written report, the diary signed by the head of base of practice about realization of all tasks.</p> <p>To be competent: in questions of safety regulation, rules of technical operation, ruled devices of heattechnical installations, the capital and accessory equipment</p> <p>To be competent: in questions of systems of technical operation of power inventory To be competent: in questions of technical operation of power inventory; new the technologies, applied at the enterprise.</p>
<p>Content</p>	<p>The purpose of educational and educational and factfinding practice is acquaintance of the high educational institution which was trained with activities, the educational programs realized high educational institution, trained specialty, types of functions problems of future professional activity. Bases educational and educational and fact-finding the practices are the educational institution, educational workshops, laboratories, ranges, pilot farms, clinics, other educational and auxiliary divisions of higher education institution, and also the organization corresponding to future professional activity.</p> <p>The purpose of work practice is- fixing of key competences, acquisition of practical skills and experience of professional activity on trained specialty.</p> <p>Bases production and technological practices are the organizations corresponding to a profile of learned specialty (or the congenerous organizations).</p> <p>For preparation and writing of the thesis (project) by the educational and professional program externship is provided.</p> <p>The content of externship is defined by a subject of the degree project (work).</p>

	During externship the student carries out collecting the actual material on professional activity of the corresponding base of practice, a practical material on a subject of the thesis (project). Results of practice are used for writing of the degree project (work) and made out as appropriate.
Forms of final control	Presentation of the report
Technical and electronic methods of education	
Literature	

module name	final state attestation
courses of academic disciplines within the module	preparation and presentation of diploma thesis(project)
semester	8 semester
responsible for the module	
working language	Russian, Kazakh
correlation with curriculum	8 semester
form of training / Number of academic hours	
load / labor intensity of the module	
credits	5 ECST
requirements according to the examination procedure	FSO PSU 8.01.2-09 «Monitoring and evaluation of educational achievements of students»
conditions	Mastering modules: mathematics, physics, theoretical fundamentals of

for receiving training within the module	electrical engineering, metrology and measurement, theory of automatic control, elements and devices of automation.
educational goals / results and competencies	Reflection of the modern scientific-theoretical and practical level of research of the problems under consideration, conducted by scientists, analysts, practitioners; Ensuring a focus on achieving concrete, practically meaningful results; Presence of independent approaches to the solution of tasks, own assessments and conclusions; Reflection of reliable data, realistic results of conducted studies and own reasoned recommendations, their use provides the solution of a specific problem; Ensuring a holistic, logical, consistent, clear and concise presentation of the material; Ensuring compliance with the norms of the literary language and the rules for processing written scientific works.
content	preparation and presentation of diploma thesis(project)
forms of final control	diploma thesis(project)
technical and electronic means	
literature	

PAVLODAR STATE UNIVERSITY NAMED AFTER S. TORAIGHYROV



MODULE HANDBOOK
of specialty **6M071700 «Heat Power Engineering»**



Akkreditierungsagentur für Studiengänge der Ingenieurwissenschaften, der Informatik, der Naturwissenschaften und der Mathematik e.V.

Pavlodar, 2017

REFERENCE OF MODULE (EP
Master degree)

1 General obligatory modules

Module name	Theory and practice of scientific research
Courses of academic disciplines according to modules	Foreign language (professional) History and science philosophy
Semester, in which module was learned	1,2
Responsible for module	Assistant professor Nevmerzhitkiy S.V.
Working language	Russian, Kazakh
Matching with curriculum	Cycle of educational disciplines (CED) Obligatory component
Form of education/Number of academic hours	Theory and practice of scientific research fulltime Lectures 15; Seminars - 60 IWS – 165.
Assignment /workload	240 hours
Credits/test units	8 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Preliminary knowledge or passing of previous modules (prerequisites) Knowledge of foreign (English) language within the school program; «History»; «Philosophy» «History of Kazakhstan»; «Person and society»; «Culturology».
Academic purposes/results and competences	To have imagination: about pragmatological aspects of transfer; to know the main models of transfer and translational transformations and to be able to use them in the analysis of translation process and its results; Knowledge: Students should know phonetics: main rules of reading and pronouncing letters of the alphabet and combinations of letters in a speech stream; spelling: writing of letters and the combinations of letters corresponding to particular sounds, spelling compliances most to the frequency lexical and grammatical signs of basic language; lexicon: word-formation models, contextual values of polysemantic words, terms

and lexical designs of the sublanguage corresponding to a profile of studied specialty; grammar: most the frequency specific grammatical phenomena of basic and natural and humanitarian and technical sublanguages.

Skills: Students should be able: to understand the general contents of difficult texts on abstract and concrete subjects, including highly specialized texts; to speak quickly enough and spontaneously to communicate with native speakers without special difficulties for any of the parties; to do accurate, detailed messages on various subjects; to state the opinion of the main problem, to show advantage and shortcomings of different opinions.

Competences: communicative competence, professional competence, linguistic competence, pragmatical competence, discursive competence, socio-cultural competence. Knowledge: The undergraduate knows: subject, tasks, principles, main methods, the most visible representatives and achievements as philosophies, and sciences. As a result of course studying the student acquired the basic categorial device of philosophy of science, is capable to comprehend a course material as necessary the theoretical instrument of understanding of the world and the place in it. Received scientifically philosophical knowledge is the precondition of successful development social and humanitarian (political science, sociology, psychology, economy), and also natural-science (physics, chemistry, etc.), and also technical knowledge.

The master degree student knows bases of philosophical knowledge, is acquainted with history of formation and variety of scientific and philosophical problems which have universal and moral character.

Skills: the master degree student has skills of a statement of own position with use of science and philosophy of categories; to promote formation at undergraduates of the positive relation to present problems.

To be competent: in the field of

	<p>methodology of scientific researches.</p> <ul style="list-style-type: none"> - social and cultural competences: ability to understand and estimate surrounding natural, social and cultural reality as interconnected whole, society and culture as result of universal activity, to realize itself as their part, to seek for their transformation from a position of dialectics of freedom and responsibility, to be the adherent of spirituality and moral. Ability to understand and accept social and cultural diversity, distinctions, to respect the and other culture as essence of society and the person, to see in them possibilities of enrichment of universal and personal experience. - intellectual and cognitive competences: aspiration to mastering by intellectual resources - logic, knowledge, values, ability to understand them, to comprehend, critically to treat them, to formulate and express the thoughts, to be able to study, seek for education and self-education, independent intellectual work - the interpersonal: knowledge of value of communication and interaction with people, aspiration to them, acceptance socially and cultural justified standards of behavior in the direct and mediated human relations (from a position of social and ethical obligations) - individual and personal competences: critical self-assessment of the abilities and opportunities, aspiration to personal self-realization, growth from a position of dialectics individual and public, to preservation and strengthening of the sincere and spiritual health from a position of universal culture (the harmonious personality, a measure material and spiritual).
<p>Content</p>	<p>The contents and level (the main cases in point in compliance with WAP)</p> <p>Phonetic, spelling, lexical, grammatical norms of a studied foreign language. Phonetics: pronouncing and rhythmical-intonational features of a foreign language, reception and reproduction of sound system of speech. Spelling: sound alphabetic system of language, basic spelling rules. Lexicon: word-formation models; basic</p>

word stock of 2500 units of basic language, and also the terms corresponding to a profile of specialty; lexicon differentiation on scopes of application. Grammar: the main parts of speech - a noun, an adjective, an adverb, a verb, an article, a pronoun, a pretext; structure of a simple and compound sentence; main models of word formation. Reading: formation of skills of factfinding, search, studying and viewing reading. Speaking: skills of dialogical and monological speech within studied subjects. Letter: development of skills of a consecutive statement of thoughts, reasonings, and also information when writing compositions and letters of personal and business character. The translation of texts in the specialty from a foreign language on native according to language norms. Audition: perception aurally messages of household, information and professional character.

Philosophy and science methodology as branch of philosophical knowledge.

Subject of philosophy of science. Its communication with science and philosophy. Variety of methodological concepts and problems. Main subjects of philosophy of science. Problems and results of philosophy of science. Their value for science and philosophy.

Specifics and interrelation of the main aspects of studying of science: logic of science, science philosophy, science history, science sociology, psychology of science and other directions.

Status and problems of history of science. Assessment of development of history of science as disciplines. Features of interrelation of philosophy of science and science history. Methodological bases of philosophy of science. Science in culture and a civilization. Science in culture system. Role and science functions in society. Science and philosophy. To history of interrelation of philosophy and science. Philosophical judgment of achievements of science. Influence of philosophical concepts on

science development. Science and art. Science and religion. Influence of science on religious perception of the world. Religion and science dialogue. Social status of science and dynamics of change of the relation to religion. Science and education.

World outlook aspects of science. Science as productive force. Humanistic horizons of science. Science and moral. Axiological status of science. The personality in science. Social parties of history of science. The sociality nature in science as a problem. Philosophy in the history of scientific ideas. Philosophy role in creativity of scientists. Philosophical and methodological problems of science as independent area of researches. Science concepts as neopositivism, logic of scientific research, science ontology, post-positivistic image of science. Strong communications of science with philosophy (A.Eynstein, N.Bor, V. Vernadsky, etc.).

Prehistory of formation of the new European science. Preconditions of emergence of an experimental method and mathematical description of the nature (G. Galilei, F.Bekon, R. Descartes). Socio-cultural preconditions of emergence of experimental (skilled) science: science socialization, science institutionalization. Features of formation of natural sciences, a role of the scientist in New time. Influence of scientific thought on philosophy (R. Descartes, Leibniz, Edging).

To a question of modern science as generation of the West European civilization. Emergence discipline. The organized science. Formation of technical science. Formation social and humanities. Social and historical knowledge.

Structure of scientific knowledge. Scientific knowledge as difficult developing system. Variety of types of scientific knowledge. Theoretical and empirical, fundamental and applied in science. Main tendencies of integration and science differentiation. Interdisciplinary programs of research. Problem

of the bases of science. Typology of the bases of science. Scientific theory as science component. Philosophical basis of science. Structure of scientific discipline. Scientific and philosophical pictures of the world. Historical forms of a scientific picture of the world. Problem of classification of sciences.

Scientific revolutions. Scientific rationality. Dynamics of science. Model of history of science. Concepts of development of science and scientific knowledge. Essence of scientific revolutions. Structure of scientific revolutions. Scientific revolutions as reorganization of the bases of science. Typology of scientific revolutions. Concepts of scientific revolution. Factors of revolutionary changes in science. Socio-cultural preconditions of scientific revolutions. Scientific revolutions and paradigms. Paradigm and structure of scientific community. Features of the present stage of science. Characteristics of modern post-non- classical science. New strategy of scientific research and development of spontaneous synergetic systems. Inter-disciplinarity and principles. Role of nonlinear dynamics in development of modern ideas of developing systems. Values in research activity. Ethical aspects of science at the end of the XX century and humanitarian control in science. Environmental and social and humanitarian assessment of scientific and technical projects. Crisis of an ideal of valuable and neutral research. Ecological ethics and science. Scientism and anti-scientism. New functions of science in culture. Global context of science. Growth of scientific information and change of the world of science.

Science emergence. Main stages of historical dynamics of science. Methodological innovations. Methodology and modern scientific methods. Main classification of methods of scientific knowledge. Concept "methodological culture", methodological barrier and explication theoretical and empirical. Philosophy and

	<p>science ratio - an object of science and universality of philosophy. In what specifics of a conceptual framework of philosophy. Whether it is possible to define philosophy as science and in what the scientific character status consists. Whether the philosophy as well as science possesses the practical importance.</p> <p>Structure and dynamics of scientific knowledge. Science as specialized form of knowledge. Variety of scientific disciplines and their basis. Dynamic and statistical regularities. Concept of objectivity and criteria of scientific character. Volume of logical criterion of scientific character. Coherence and vulnerability of procedure of an explanation. Dismembering (analytical) and generalizing (synthetic) knowledge. Gnoseological chain: question - a problem - a hypothesis - the theory - the concept. What there is a truth? Analysis of technical science as special direction of philosophy of science. Inventions, improvement and innovations.</p> <p>Classical, non-classical and post-non-classical pictures of the world. Uncertainty as attributive characteristic of life. The theory of selforganization only. Order and chaos - dialectics or metaphysics. Relativistic concept of the Universe. Whether is scientific rationality a synonym of methodology of science. European civilization - a rational civilization. Various models of rationality. Non-classical and post- non-classical image of rationality. Boundlessness of new rationality. The "opened" and "closed" rationality. Than rationality is limited? Rationality in consciousness structure. Rationality functions.</p>
Forms of final control	Examination Computer testing
Technical and electronic methods of education	<p>Multimedia class (computers with columns and earphones), electronic dictionaries Electronic tutorials: Slide lectures, presentations, philosophical literature (textbooks, anthologies, dictionaries) in electronic form.</p> <p>Technical means of training: projector, electronic</p>

	board, laptop
Literature	<p>Main:</p> <p>1. Asylkhanova L. E., Zhumabekova B. K. [etc.] German: the manual for non-lingual specialty student..-Pavlodar: Kereku. -2008.-182 p.</p> <p>2. Basova N.V., Vatlina L.I. [etc.] German for technical the university: the manual for the university.-5th print corrected- D:Fenix. -2005.505p.</p> <p>3. Goncharova E. A., Shishkina I.P. Text interpretation: German: the manual for the university students.- M.: High school. -2005.367p.</p> <p>Additional:</p> <p>4. Latishev L. K. Translation technology: the manual for the university students of "Translation and Law".-4th print-M.: Academy. - 2008.-317 c.</p> <p>5. Alexeyeva I. S. Writing translation: German: the manual -2006.-362 c.1. Essential Grammar in Use. Murphy R. - Cambridge University Press:2002</p> <p>6. Understanding and Using English Grammar, third edition. Betty Schrupfer Azar - Longman:1999</p> <p>7.Semenova S. D. Mastering English Grammar. Study guide on English for students of 1 and 2 courses of all specialties of East Kazakhstan State Technical University - Ust Kamenogorsk</p> <p>8 . Arlychev A.N. Qualitative aspect of the world and its knowledge. M, 2001.</p> <p>9 . Bunge M. Physics philosophy. M, 2003.</p> <p>10 . Vernadsky V. I. Reflection of the naturalist. Scientific thought as planetary phenomenon. Book 2. M, 1977.</p> <p>11 . Voytov A.G. Thinking self-instruction manual. - M, 2001.</p> <p>12 . Voytov A.G. Philosophical basis of theoretical science. M, 1999.</p> <p>13 . Ilyin V. V. Yuldashev L.G. Modern scientific philosophy. M, 2003.</p> <p>14 . Mikeshina L.A. Philosophy of Knowledge . M, 2002.</p>

15 . Ovchinnikov N. F. The methodological principles in the history of scientific thought. M, 1997.

16 . Salin D. K. Hundred great discoveries. - M, 2002.

17 . Thompson M. Science philosophy. M, 2003.

18 Great thinkers about great questions:: Modern western philosophy. M, 2001.

19 Kokhanovsky Accusative, etc. Bases of philosophy of science. M, 2004.

20 Agazzi E. Moral measurement of science and equipment. M, 1998.

Module name	Bases of high school
Courses of academic disciplines according to modules	Psychology, Pedagogics, Technique of teaching of heat power disciplines
Semester, in which modules was learned	1, 2
Responsible for module	Professor Burdina E.I.
Working language	Russian
Matching with curriculum	Cycle of educational disciplines (CED) Obligatory component
Form of education/ Number of academic hours	Lectures - 75 Seminars -45 IWS- 270
Assignment/ workload	Total 390 hours
Credits/ test units	13 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of educational reception according to modules	Preliminary knowledge or passing of previous modules (prerequisites) - «Philosophy»; - «Person and society»; - «Culturology»; - «Problems of human development»; - «Politology»; - «Sociology».
Academic purposes/ results and competences	Purposes of learning disciplines Purposes: receiving by master degree students of psychological knowledge, mastering by methodology for scientific knowledge of the personality, development of psychological thinking of students on the basis of studying

and assimilation of knowledge of psychology by them, formation of skills of the system analysis of the psychological phenomena, formation of the scientific methodological principles of scientific outlook, studying of the most fundamental facts and the regularities concerning psychological mechanisms of behavior, communication and activity of people.

To have imagination: about variety of forms of human knowledge, a ratio of truth and delusion, knowledge and belief, rational and irrational in human activity, features of functioning of knowledge in modern society, cultural wealth, their value in creativity and an everyday life

Problems of studying of discipline

Systematization of knowledge of master degree students on psychology on the basis of studying of all-psychological regularities, psychological phenomena; knowledge of the methodological principles and modern problems of psychology;

Providing conditions for assimilation by master degree students knowledge of factors and regularities of development of psychology, a subject of psychology and approaches to its studying;

Mastering by logic of scientific research on the basis of studying of logic of historical development of science;

Acquaintance to the basic principles, approaches and achievements of world and domestic psychological science;

Development of skills of informative activity of master degree students in the course of the system and psychological analysis of various theories and the psychological facts;

Formation at master degree students of abilities to analyze emergence and further development of scientific approaches to studying of the psychological phenomena;

_____ Motivation of master degree students to

application of psychological knowledge, skills in practice, to independent deeper studying of psychology of the person.

Skills

- professional communication and cross-cultural communication;
- definitions of communication of scientific development of psychology with society history, the material and spiritual culture, interdisciplinary sciences;
- expansion and the increasing knowledge, necessary for daily professional activity and education continuation;
- skills of educational and research activity.

Competences

The course has to promote formation of the identity of the young specialist, the engineer, increase of its general and social and psychological culture, competence of interaction and activity, and also to help the undergraduate with acquisition of experience of the organization of professional communication, adoption of individual and joint decisions, reflections and outlook expansions;

- to know regularities of psychological development of the personality in society;
- to be able to apply adequately knowledge of personal features of the person as a factor of success of mastering and implementation by it educational and professional activity;
- to be capable to make decisions, relying on knowledge of social and psychological human nature and society;
- to be capable to development of various abilities, cultures of brainwork, self-education. To have imagination: about professional competence of the teacher of the higher school. To know: psychology of informative activity of students in the course of training; psychological methods and means of increase of efficiency and quality of education. To be able: to apply knowledge of pedagogics and psychology of the higher school in the

	<p>pedagogical activity; to apply interactive methods of education.</p> <p>To have skills: implementation of educational and pedagogical activity on credit technology of training; techniques of teaching of professional disciplines.</p> <p>To be competent: in the field of scientific and scientific and pedagogical activity in the university; in questions of modern educational technologies.</p>
<p>Content</p>	<p>The contents and level (the main cases in point in compliance with WAP)</p> <p>Education system in a context of modern culture. Pedagogics as science. History of formation of the higher education and tendency of its development in the future. Bases of didactics of the higher school. Training theory. System of the higher education and its specifics. The high education in Kazakhstan. Maintenance of the higher education: theory and practice. Contents education: from planning of the purposes of training to selection of the content of education. Assessment of results of training. Forms and training methods. The high school educational book as a way of information communication in educational process of the higher school. Forms of the organization of educational process. Optimization of educational process. Independent work of students. Educational process at the higher school. Pedagogical skill of the teacher of the higher school. Psychology as cultural and historical science. Image of modern psychology. Culture and fully functioning person. Look of cultural and historical psychology. Person as object of psychology and pedagogics. Mentality and reality: psychology of informative processes. Mentality and reality: perception, memory, thinking. The person developing: main regularities and conditions of full development. The person developing: age features of students. Socially - the psychological bases of education: personality and group. Constructive communication and</p>

	full value of human life. Social and psychological bases of communication and cooperation.
Academic purposes/ results and competences	<p>To have intensive methods of education of undergraduates to the main principles of modern ways of teaching of heat power disciplines.</p> <p>To be able: methodology of activization of informative activity with use of such methods as creation of a problem situation, search - heuristic, research.</p> <p>To know: ways of development of modern methods of teaching of the special disciplines defining the direction of preparation "Power system".</p> <p>To have skills: works with technical means of training.</p> <p>To be competent: in a choice of a technique of training.</p> <p>Social and psychological bases of communication and cooperation.</p>
Forms of final control	Complex examination
Technical and electronic methods of education	

Literature

1. Andreeva G. M. Social psychology. The manual. - M: Aspect Press. 1998 . - 376 pages.
2. Gippenreyter Yu.B. Introduction in the general psychology. Course of lectures. - M: Chero, 1998. - 336 pages.
3. Grachev N. N. Psychology of engineering work: The manual, - M. : The higher school, 1998. - 333 pages.
4. Quinn V. Applied psychology. The manual. - 2000 . - 558 pages.
5. Kozlov N.I. Formula's goats of the personality. - : Publishing house "St. Petersburg", 1999. - 368 pages.
6. Craig G. Development psychology. The manual. - Publishing house "St. Petersburg". - 2000, 992 pages.
7. Cousins V.S. Psikhologiya. The manual. - M, 1997. - 304 pages.
8. Kuzmin I. Psychotechnologies and effective management. - M: Technological business school. - 1994 . - 192 pages.
9. Jobbers A.G. Obshchaya psychology. The manual. - SPb. 2000 . - 582 pages.
10. Nemov R. S. Psychology. The manual. In 3 books - M, 2001.
11. Psychology. The manual / Edited by A.A.Krylov. - M, 1998. - 584 pages.
12. Psychology. The manual / Edited by V. N. Druzhinin. - SPb. 2000 . - 671 pages.
13. General psychology. The textbook / Edited by E.I.Rogova. - M, 1999. - 447 pages.
14. Robert M.-A. Tilmant F. Psychology of the individual and group. - M, 1988. - 256 pages.
15. Sokolova E.E. Thirteen dialogues about psychology. - M, 1995. - 652 pages.
16. Abdymanapov S. A. Nefedov L.V. Akhmetkarimov G. S., Sokolov M. G. Tests: theory and practice. - Astana, 2001. - 194 pages.
17. Guzeev V. V. Pedagogical equipment in a context of educational technology. M: National education, 2001. 128c.
18. Dzhusubaliyeva D., Mynbayev A. Regularities of educational space and information society//the Higher school of Kazakhstan, 2000, No. 1, page 52-59.
19. Kaymuldina A. Humanitarization of

2. Deepening of special knowledge (specialization) 2.1

Obligatory modules in the specialty

Module name	Modeling of processes and installations in an energy and heattechnology
Courses of academic disciplines according to modules	Scientific and technical problems of power system and heating engineers Modeling of processes and installations in an energy and heattechnologies/Modern problems of informatization of power system and heattechnology
Semester, in which modules was learned	1 semester
Responsible for module	Assistant professor PrikhodkoE.V.
Working language	Russian
Matching with curriculum	EP - Scientific and technical problems of power system and heating engineers Obligatory component 1 semester KV - Modeling of processes and installations in an energy and heattechnologies/Modern problems of informatization of power system and heattechnology 1 semester
Form of education/ Number of academic hours	Lectures -52.5 hours Practical lessons -30 hours IWS – 187.5 hours.
Assignment/ workload	General quantity of hours: - 270 hours
Credits/ test units	9 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of educational reception according to modules	Mastering of modules: mathematics, physics, theoretical bases of electrical equipment, metrology and measurement, elements and automatic equipment devices, technology of programming.
Academic purposes/ results and competences	To have imagination: - about a current state of the RK power complex; questions of modernization and updating of funds. To know: legal and the regulations defining efficiency of power use; ways and problems of holiday of heat to consumers in couple and hot water with combined heat and power plant; the general principles of realization of technological

	<p>processes on thermal power plants of a various look; the general principles of power use in heattechnical production; main schemes of systems of production and distribution of energy carriers; condition, problems and the directions of development of energy saving in the world and Kazakhstan now; modern methods and devices of control and accounting of energy carriers; methods of mathematical modeling of heat power and heattechnological installations and systems; designs modern industrial warm mass-exchange devices and methods of their calculation.</p> <p>To be able: to prove a choice of the scheme of thermal power plant; to calculate need for energy and heat of various heattechnical processes; to analyze the processes proceeding in heattechnological installations; to prove a choice of the capital and service equipment of stations on production of energy carriers;</p> <p>To have skills: the analysis of existing schemes of systems of production and distribution of energy carriers.</p> <p>To be competent: in methods of calculation of power indicators of thermal power plant.</p>
Content	<p>To have imagination: about modern methods of mathematical modeling; about legal aspects of application of information technologies To know: numerical methods of the solution of problems of stationary and non-stationary heat conductivity, convective heat exchange; ways of algorithmization and programming, storage, processing and submission of information; technique of modeling of power objects and equipment.</p> <p>To be able: to use text and graphic editors, multimedia means and a computer network; to use ready packages of applied programs for performance of heat power calculations; to choose an effective numerical method for the solution of a specific objective; to create mathematical models of power objects and the equipment.</p> <p>To have skills: works with computer programs</p>

	for drawing up mathematical models. To be competent: in questions of modeling of processes of heat exchange of power installations.
Academic purposes/ results and competences	to count main parameters of water treatment installations; to estimate efficiency of power use in branches of a national economy; to develop energy saving actions
Forms of final control	To have imagination: - about a technique of definition of potential and possible secondary energy resources in the main technological processes; - about a design of systems and devices of utilization of secondary energy resources. To have skills: the analysis of existing thermal schemes and determination of potential of secondary energy resources. To be competent: in methods of calculation of power indicators when using secondary energy resources.
Technical and electronic methods of education	
Literature	1. Levental G. B., Popyrin L.S. Optimization of heat power installations. M: Energy, 1970, 352 pages. 2. Krasnoshchekov P. S. Principles of creation of model. M: MSU,1983. 3. Moiseyev N. N. Math problems of the system analysis. M: Science, 1981. 4. Tsirlin A.M. Optimum control of technological processes. M: Energoatomizdat, 1986. 5. Beloglazov V.P. Study guide on design of industrial heattechnical devices and installations on the basis of numerical modeling. Almaty, 1988. 6. Zaicev A.I. Mathematical modeling of sources of power supply of the industrial enterprises. M: Energoatomizdat, 1991.

2.2 In choice component

Module name	Use of secondary energy resources and business Kazakh
Courses of academic disciplines according to modules	Business Kazakh Methods of Teaching Heat Power Engineering Disciplines

Semester, in which modules was learned	2,3 semester
Responsible for module	Assistant professor Prikhodko E.V.
Working language	Russian
Matching with curriculum	In choice component 2, 3 semester
Form of education/ Number of academic hours	Lectures - 45 часов Professional lessons – 52,5 часов IWS – 232.5 часов.
Assignment/ workload	General quantity of hours - 330
Credits/ test units	11 ECST
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of educational reception according to modules	Mastering of modules: mathematics, physics, theoretical bases of electrical equipment, metrology and measurement, elements and automatic equipment devices, technology of programming.
Academic purposes/ results and competences	<p>To have imagination: about pragmatical aspects of transfer; to know the main models of transfer and translational transformations and to be able to use them in the analysis of translation process and its results.</p> <p>To know: methods and receptions of drawing up presentations, materials for business meetings, negotiations, discussions in German; the main professional terminology in "Power system".</p> <p>To be able: to perceive contents of the read and heard text of popular scientific article, the textbook or the monograph.</p> <p>To have skills: writing of scientific works, theses of reports, participations in conferences.</p> <p>To be competent: in carrying out the comparative analysis of the terms used in power system, for the Kazakh and Russian languages</p>
Content	<p>To have imagination: - about a technique of definition of potential and possible secondary energy resources in the main technological processes;</p> <p>- about a design of systems and devices of utilization of secondary resources.</p> <p>To know: techniques of definition of potential and possible secondary energy resources in the</p>

	<p>main technological processes; designs of systems and devices of utilization of secondary energy resources</p> <p>To be able: to carry out the analysis of the secondary energy resources which are available at the industrial enterprise; to apply methods and receptions of increase in energy efficiency of available secondary energy resources.</p> <p>To have skills: the analysis of existing thermal schemes and determination of potential of secondary energy resources.</p> <p>To be competent: in methods of calculation of power indicators when using secondary energy resources.</p>
Academic purposes/ results and competences	Aspects of translation of technical texts in "Power system"; main models of transfer, and also analysis of translation process and its results.
Forms of final control	Examination
Technical and electronic methods of education	
Literature	<ol style="list-style-type: none"> 1. Kirillin V.A. Power engineering. Main problems of M: Knowledge. 1990, 123p. 2. Ross David. Energy of waves. L. : Gidrometioizdat. 1991.C 112. 3. Glazyrin A.I. Glazyrin A.A. Orumbayev R. K. Corrosion and preservation of the heat power equipment. - Pavlodar. : ECO, 2011 pages 726. 4. Takibayev Zh.S. Physical bases of solar and hydrogen power. Almaty. Rauan. 1992 .p 176 5. The program of development of nuclear power of the Russian Federation for 19982005 and for the period from 2010: The resolution of the government of the Russian Federation of July 21 1985. No. 815. 6. White book of nuclear power. / Edired by Professor E.O.Adamov. First edition of M: State Unitary Enterprise NIKIET. 1998 . "Power: figures and facts. On IAEA

materials.

7. World power: the development period till 2020. Translation from English / Edited by Yu.N.Starshinova. - M: Energy. 1990 . with-256.
8. Doctor Gaud. Prospects of development of thermal power plants on organic fuel. KWU department. Simens firm. Power system No. 2, 2000
9. About prospects of development of power industry of Russia for the next 15 years the "Energetik" Magazine for 2001
10. Rational use of gas in power installations. Reference guide (Edited by A.S.Isserlin). JI: Nedra 1990,p. 423
11. Prospects of development of thermal power plants on organic fuel (No. 2, 2000)
12. Dukenbayev K.D. "Power industry of Kazakhstan". Almaty. Gylym 2002.
13. Glazyrin A.I. Utilization of components of combustion gases of heat power installations Almaty, Gylym, 1992 pages 166
14. Glazyrin A.I. Kostrikina E.Yu. Preservation of the power equipment - M: Energoatomizdat: 1987, page 168
15. The directory power system (edited by Grigoriev)
16. Alekseeva T.I. Litvak V. V. Energy saving stimulation. Industrial power system. No. 12, 2002 of.

Module name	Reliability of operation of high-temperature units
Courses of academic disciplines according to modules	Reliability of work high-temperature units/service conditions of linings of high- temperature units
Semester, in which modules was learned	3 semester
Responsible for module	Assistant professor Prikhodko E.V.

Working language	Russian
Matching with curriculum	In choice component 3 semester
Form of education/ Number of academic hours	Lectures - 45 hours Practical lessons -15 hours IWS - 150 hours.
Assignment/ workload	General quantity of hours: - 210 hours
Credits/ test units	7ECST
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of educational reception according to modules	Mastering of modules: mathematics, physics, theoretical bases of electrical equipment, metrology and measurement, theory of automatic control, elements and automatic equipment devices.
Academic purposes/ results and competences	<p>To have imagination: about reliable and safe operation of the heattechnical equipment of thermal power plants, technology and schemes of the decision on protection of the equipment against corrosion</p> <p>To know: bases of reliable and safe operation of the heattechnical equipment of thermal power plants, technology and schemes of the decision on protection of the equipment against corrosion. To know the main requirements for reliability of operation of high-temperature units;</p> <p>To be able: to put the received theoretical knowledge to the solution of practical tasks at design and safe operation of the equipment of thermal power plant and the industrial enterprises.</p> <p>To have skills: solutions of problems of increase of reliability of work of the existing equipment. To be competent: in questions of a choice of criteria of reliability of work of this equipment.</p>
Content	bases of reliable and safe operation of the heattechnical equipment of thermal power plants, technology and schemes of the decision on protection of the equipment against corrosion. To know the main requirements for reliability of operation of high-temperature units;
Forms of final control	Examination

Technical and electronic methods of education	
Literature	<p>1 . Kuznetsov L.Yu. Reliability and profitability of the equipment of a thermal power plant. Kiev. Equipment. 1977.p180</p> <p>2 . Rules of technical operation of power plants and networks. M: Energoatomizdat 1989. p. 287</p> <p>3 . Safety regulations at operation of the heatpower equipment of power plants of M: 1972, Atomenergoizdat.</p> <p>4. . Service regulations of heatconsuming installations and thermal networks. Safety regulations at operation of heatconsuming installations and thermal networks of the consumer. M, Omega - Item 2004. page 150</p> <p>5. Glazyrin A.I. Glazyrin A.A. Orumbayev R. K. Corrosion and preservation of the heat power equipment. - Pavlodar. : ECO, 2011 pages 726.</p> <p>6 . Technique of definition of consumers in heat, electric energy and water by production and transfer of thermal energy and heatpumps in system of a municipal heat supply. M, Dian, 2005. page 156</p> <p>7 . Yerofeev V. L. The heattechnical manual for students of the university. M, Academic book. 2008 . page 488.</p> <p>3. Razinsky V. F. Grin E.A. Reliability and safety of thermal power plant of Russia at the present stage: problems and perspective tasks. — "power system", 2010, No. 2, page 2-5.</p> <p>8. Grachev I.D. Nekrasov S. A. Some aspects of power supply of small settlements. "power system", 2010, No. 4, page 12-15.</p> <p>9. Marchenko O. V., Culms of Page of Century. System researches of efficiency of renewables. "power system", 2010, No. 11, page 12-15.</p> <p>10. Goryachikh N.B., Batukhtin A.G. Ivanov S. And Some methods of increase of maneuverability of combined heat and power plant. "power system", 2010, No. 10, page 69-71</p> <p>11 . Aronson K.E. etc. Analysis of indicators of increase of reliability of the service equipment of power units. "power system", 2011, No. 8, page 2-5.</p>

12 . Boss of M.M., Batukhtin A.G. Integrated approach to optimization of functioning of modern systems of a heat supply. "power system", 2011, No. 8, page 55-58.

13 . Zeygarnik Yu.A. Zhukov V. M., VA Barrows. Poles of A.F. heat exchange research in power installations and devices at the Joint institute of temperatures of the Russian Academy of Sciences. "power system", 2011, No. 4, page 2-5.

14. _____ T
 he rules of devices and safety of operation steam and boilers. M, Energoatomizdat. 1989 . page 176._____

Module name	Special questions of water and chemical modes
Courses of academic disciplines according to modules	Special questions of water and chemical modes/ VHR thermal power plant on supercritical parameters
Semester, in which modules was learned	3 semester
Responsible for module	Professor Glazyrin A.I.
Working language	Russian
Matching with curriculum	In choice component 3 semester
Form of education/ Number of academic hours	Lectures -30 hours Practical lessons -15 hours IWS - 105 hours.
Assignment/ workload	General quantity of hours: - 150 hours
Credits/ test units	5 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of educational reception according to modules	Mastering of modules: mathematics, physics, theoretical bases of electrical equipment, theory of automatic control, elements and automatic equipment devices, technology of programming.
Academic purposes/ results and competences	To have imagination: about conditions of safe operation of the equipment; maintenance of the optimum water and chemical Nobility mode: features of water and chemical modes of the heat power equipment, questions of purification of condensate of steam returned from various productions.

	<p>To be able: to make technological cards of maintaining various water and chemical modes, to make start-up and adjustment of modes To have skills: maintaining water and chemical modes of the heat power equipment with application of innovative development.</p> <p>To be competent: in questions of performance of technological calculations and regime cards of processes and devices.</p>
Content	Water and chemical modes of the heat power equipment, questions of purification of condensate of steam returned from various productions
Forms of final control	Examination
Technical and electronic methods of education	
Literature	<p>Rules of technical operation of power plants and networks. M: Energoatomizdat, 1989, p.287</p> <p>2 Margulova T.KH. Martynova O. I. Water modes of thermal and nuclear power plants, M: The higher school, 1987 - 320 p.</p> <p>3 Glazyrin A.I. Muzyka L.P. Kabdualiyeva M. M. Water and chemical modes of thermal power plants and boiler industrial enterprises. / Manual/, Pavlodar, Republican publishing office, 1994. -120 p.</p> <p>4 Belokonova A.F. Water and chemical modes of thermal power plants, - M: Energoatomizdat, 1985,-248p.</p> <p>5 Mankina N. N. Physical and chemical processes in a steam cycle of power plants. - M: Energy, 1977,-256p.</p> <p>6 Glazyrin A.I. Kostrikina E.Yu. Preservation of the power equipment. - M: Energoatomizdat, 1987,-168p.</p> <p>7 The instruction on operational water analysis and couple on thermal power plants. / Edited by Yu.M.Kostrikin. M: . SPO Soyuztekhnenergo. 1979 . p120</p> <p>8 Lifshits O. V. Directory on water treatment of boiler installations. M: energy, 1976.p 287</p> <p>9 Kostrikin YU.M. Meshchersky N.A., Korovin O. V. Water treatment and water mode of power objects of low and average pressure. Directory.</p>

M: Energoatomizdat. 1990 pages 253
 10 Glazyrin A.I. Utilization of components of combustion gases of heat power installations. - Almaty, Gylym, 1992. -168p

11. 11 . Sterman P. S., Pokrovsk Century of N. "Chemical and thermal methods of processing of water on thermal power plant". M: energy, 1981

Module name	Nature protection technologies during the work of heat power installations
Courses of academic disciplines according to modules	Nature protection technologies during the work of heat power installations / Nonconventional methods of purification of leaving gases of thermal power plant and software
Semester, in which modules was learned	3 semester
Responsible for module	Professor Nikiphorov A.S.
Working language	Russian
Matching with curriculum	In choice component 3 semester
Form of education/ Number of academic hours	Lectures - 60 hours Practical lessons -15 hours IWS - 195 hours
Assignment/ workload	General quantity of hours: - 270 hours
Credits/ test units	9 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of educational reception according to modules	Mastering of modules: mathematics, physics, theoretical bases of electrical equipment, metrology and measurement, theory of automatic control, elements and automatic equipment devices.
Academic purposes/ results and competences	To have imagination: about modern methods of suppression of emissions of harmful substances at the enterprises and modern devices for environmental protection during the work of the heat power equipment. To know: methods of definition of emissions of polluting substances in environment and their decrease; methods of neutralization of sewage of the power enterprises. To be able: to consider standards of quality of environment at design and operation of

	<p>objects; to choose the most effective in the ecological relation creation of heat technological process; to develop effective ways of suppression of formation of harmful substances and methods of cleaning of emissions of industrial enterprises.</p> <p>To have skills: calculations of emissions of harmful substances when burning different types of organic fuel.</p> <p>To be competent: in the analysis of modern schemes of decrease harmful emissions on thermal power plant and software.</p>
Content	Methods of definition of emissions of polluting substances in environment and their decrease; methods of neutralization of sewage of the power enterprises.
Forms of final control	Examination
Technical and electronic methods of education	
Literature	<p>1 Ecological right of the Republic of Kazakhstan. Baydeldinov D. L. Almaty, 2004.</p> <p>2 Industrial and household wastes: storage, utilization, processing. Grinin A.S. Novikov V. N. M.: FAIR-PRESS, 2002.</p> <p>3 Ecology and environmental management economy: The manual. Tonkopy M. S. Almaty: Economy, 2003</p> <p>4 Ecology and environmental management economy: The manual. Tonkopy M. S. Almaty: Economy, 2006</p> <p>5 Ecology and environmental protection at chemical pollution. L.K.Sadovnikova, D.S.Orlov, I.N.Lozanovskaya of M.:high school 2008</p> <p>6 Environmental protection. A.A shuttles. Minsk: high school, 2008.</p> <p>7 Restoration of ecosystems broken by oil products: the manual A.P. Bondarenko, K.U.Bazarbekov. Pavlodar: PSU named after S. Toraihyrov, 2006</p>

Module name	Pedagogical practice
Matchingwithcurriculum	Obligatory component 1,2,3 semester
Form of education/Number of academic hours	
Assignment /workload	
Credits/test units	4 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: pedagogics and psychology
Academic purposes/results and competences	Knowledge of specifics and nature of pedagogical and educational work of the teacher of the higher school, educational and methodical, organizational and methodical and educational work of chairs of faculties; application of knowledge, skills by a technique of teaching of disciplines of specializations and psychology-pedagogical disciplines in practice; formation in the course of practice of professional personal qualities, cultures of scientific and pedagogical thinking, professional and pedagogical skills of creative activity.
Content	
Forms of final control	Presentation of report
Technical and electronic methods of education	
Literature	

Module name	Research practice
Courses of academic disciplines according to modules	Research practice
Semester, in which module was learned	2,4 semester
Responsible for module	
Working language	Russian
Matchingwithcurriculum	Obligatory component 2,4 semester
Form of education/Number of academic hours	
Assignment /workload	

Credits/test units	13ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements of students »
Conditions of education reception according to modules	Mastering of modules: pedagogics and psychology
Academic purposes/results and competences	Ability to choose necessary methods of research (to modify existing, to develop new methods), proceeding from problems of concrete research (on a subject of the master thesis or when performing tasks of the research supervisor within the master program); ability to apply modern information technologies when carrying out scientific researches; ability to process the received results.
Content	The analysis and representation of researches in the form of the finished research development (the report on research work, theses of reports, the scientific article, a term paper, the master thesis); registration of results of the done work according to requirements of the established normative documents with attraction of modern editing tools and the press.
Forms of final control	Presentation of report
Technical and electronic methods of education	
Literature	

Practical Professional Part

Module name	Scientific research work
Matchingwithcurriculum	Obligatory component 2,4 semester
Form of education/Number of academic hours	
Assignment /workload	
Credits/test units	29 ECTS
Requirements, according to examination procedure	FSA PSU 8.01.2-09 «Control and assessment of academic achievements

	of students »
Conditions of education reception according to modules	Mastering of modules: pedagogics and psychology
Academic purposes/results and competences	Acquisition of skills of performance of research work within statement of the solution of scientific and technical problems.
Content	
Forms of final control	The report
Technical and electronic methods of education	
Literature	

Module name	final state attestation
Courses of academic disciplines within the module	preparation and presentation of master's thesis
semester	4 semester
responsible for the module	
working language	Russian
correlation with curriculum	4 semester
form of training / number of academic hours	
load / labor intensity of the module	
credits	12 ECST
requirements according to the	FSO PSU 8.01.2-09 «Monitoring and evaluation of educational achievements of students»

examination procedure	
conditions for receiving training within the module	Mastering modules: mathematics, physics, theoretical fundamentals of electrical engineering, metrology and measurement, theory of automatic control, elements and devices of automation.
educational goals / results and competencies	<p>Reflection of the modern scientific-theoretical and practical level of research of the problems under consideration, conducted by scientists, analysts, practitioners;</p> <p>Ensuring a focus on achieving concrete, practically meaningful results; Presence of independent approaches to the solution of tasks, own assessments and conclusions;</p> <p>Reflection of reliable data, realistic results of conducted studies and own reasoned recommendations, the use of which provides the solution of a specific problem;</p> <p>Providing a complete, logical, consistent, clear and concise presentation of the material;</p> <p>Ensuring compliance with the norms of the literary language and the rules for processing written scientific works.</p>
content	preparation and presentation of master's thesis
forms of final control	master's thesis
technical and electronic means	
Literature	