

Ministry of Education and Science of Ukraine  
State Higher Educational Institution  
«Ukrainian State University of Chemical Technology»

Rector of SHEI USUCT  
\_\_\_\_\_ Pivovarov O.A.  
«\_\_\_» \_\_\_\_\_ 2016.

## **EDUCATION PROGRAMME PROFILE**

**Heat power engineering**

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**The first (bachelor) level**

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**Bachelor of Science**

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**Field of education knowledge** **14 Electrical engineering**

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**Specialisation** **144 Heat power engineering**

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Approved at the SHEI USUCT  
Academic Council meeting  
«\_\_\_».\_\_\_\_\_.2016.  
Protocol No. \_\_\_\_

Dnipro  
2016

## I. PROGRAMME PROFILE OF ELECTRICAL ENGINEERING BACHELOR'S DEGREE specialization "Heat power engineering"

<b>Programme profile (general information)</b>	
<b>Full name of qualification</b>	Bachelors of Science in Electrical Engineering, Heat power engineering
<b>The name of education programme</b>	Bachelor's Education Training Programme in Heat Power Engineering
<b>Diploma type and Program workload and duration</b>	Bachelors of Science Diploma in Electrical Engineering, Heat power engineering; 4 years – 8 semesters (full-time study) – 240 ECTS-Credits
<b>Higher educational establishment</b>	State Higher Educational Institution «Ukrainian State University of Chemical Technology»
<b>Accreditation institution</b>	Accreditation commission of Ukraine (National agency of higher education quality assurance)
<b>Licence</b>	Was accredited in 2013, series HD-II № 0423948, Expire date: 01.07.2018.
<b>Level</b>	National Ukrainian Qualification – 6 level, FQ-EHEA – First level, EQF-LLL – Level 6
<b>Entrance conditions</b>	Complete secondary education
<b>Language of teaching</b>	Ukrainian language
A	<b>Education programme purpose</b>
<b>Programme Purpose</b>	Students can gain knowledge, skills and experience in the field of electrical engineering. They will be able to solve professional problems, such as: the study, carrying out the projects in the field of heat-power technologies, exploitation, installation repair and modernization of technical means for heat-power production and energy transformation.
B	<b>Programme characteristics</b>
<b>Subject (field of knowledge, specialization)</b>	Field of education knowledge 14 – <i>Electrical engineering</i> : Specialization 144 - <i>Heat power engineering</i>
<b>The main focus of the programme and specialization</b>	General high education in the field of electrical engineering
<b>Programme status</b>	Education-professional
<b>Peculiar and distinctive features</b>	The programme gives additional practical experience due to the practical training period.
C	<b>Graduate rights</b>
<b>Employment</b>	The programme graduates are employed in a wide range of high-technology industries such as power energy production, heat supply, engineering services, etc.
<b>Graduate academic</b>	The programme will provide the students with the necessary

<b>rights</b>	requirements for academic advancement in the electrical engineering field.
<b>D</b>	<b>Teaching and learning activities and assessment methods</b>
<b>Teaching and learning activities</b>	Lectures, practical and seminar classes, experimental laboratory study, term paper writing, self-training, preparation and writing of final qualifying (diploma) work.
<b>Assessment methods</b>	Periodic written and oral tests, exams, presentations, final oral bachelor's certification exam.
<b>E</b>	<b>Programme competences</b>
<b>Integral competence (IC)</b>	Bachelor (level 6): Capacity to solve special complex and practice problems in the certain professional field. It suggests the use of certain theory and methods and characterized by complexity and uncertainty of conditions.
<b>Generic competences (GC)</b>	<p>GC-1.Ability for abstract thinking, analysis and synthesis on the basis of logic, arguments and proven facts.</p> <p>GC-2.Ability to plan and manage time.</p> <p>GC-3.Ability to apply knowledge in practical situations</p> <p>GC-4.Ability to communicate both orally and through the written word in native language, ability to communicate in second language.</p> <p>GC-5.Ability to find, select and analyse information from different sources using information and communication technologies.</p> <p>GC-6.Awareness of the need to keep industrial safety and labour hygiene.</p> <p>GC-7.Capacity to learn and stay up-to-date with learning.</p> <p>GC-8.Ability to act with social responsibility and civic awareness.</p> <p>GC-9.Capacity to know and understand the subject area.</p> <p>GC-10.Ability to work in a team.</p> <p>GC-11.Ability to identify and to solve problems.</p> <p>GC-12.Appreciation of and respect for diversity and multiculturality.</p> <p>GC-13.Commitment to the conservation of the environment.</p>
<b>Subject specific competences (SC)</b>	<p>SC-1. Ability to use basic knowledge in the field of natural sciences and to use the basic laws of natural sciences in professional activity, to use the methods of mathematical analysis and simulation, theoretical and experimental studies.</p> <p>SC-2. Basic knowledge of the main branch of mathematics, and ability to use mathematic methods in the chosen professional area.</p> <p>SC-3. Basic knowledge of fundamental sciences that is</p>

	<p>necessary to learn the specific subjects of professional application.</p> <p>SC-4. Ability to apply obtained knowledge in dynamic systems simulation and at estimation of system efficiency.</p> <p>SC-5. Ability to apply obtained knowledge in fluid dynamics, thermodynamics and heat and mass transfer processes.</p> <p>SC-6. Ability to define production and non-production expenses to reach the necessary production quality.</p> <p>SC-7. Ability to participate in standardization work and certification of technical materials and equipment.</p> <p>SC-8. Ability to predict quantitative characteristics of the processes which take place in the certain technical systems, based on standard methods.</p> <p>SC-9. Ability to make natural and numerical experiments, ability to develop the experimental.</p> <p>SC-10. Ability to participate in heat and mass-transfer equipment study and testing, in processes of installation, adjustment and technical maintenance.</p> <p>SC-11. Ability to formulate the projects aim, to choose criteria and indicators, and choose priority decision.</p> <p>SC-12. Ability to develop the parts of new technical apparatus taking into account the necessary requirements.</p> <p>SC-13. Ability to work out technical documents in accordance with unified construction system.</p> <p>SC-14. Ability to take part in equipment designing for heat power stations and another energetic plants taking into account environmental and safety requirements.</p> <p>SC-15. Ability to demonstrate and use the knowledge of the basic processes in energetic machines, devices and apparatuses.</p> <p>SC-16. Work skills with regard to professional activities, ability to comply with safety, fire and labor safety requirements.</p> <p>SC-17. Ability to study new technological processes and equipments.</p>
<b>F</b>	<b>The programme learning outcomes</b>
<b>The cognitive learning outcomes</b>	<p>CLO-1. Ability to apply humanities and socio-economic sciences at professional problem solving.</p> <p>CLO-2. To use knowledge of the basic economic laws to analyze economic efficiency of some production processes.</p> <p>CLO-3. To be able to use communication skills, be able to express oneself clearly, to communicate effectively in professional area.</p> <p>CLO-4. To have speaking, writing and listening skills for</p>

	<p>basic communication in any foreign language for professional purposes.</p> <p>CLO-5. To be able to increase professional level through self-education.</p> <p>CLO-6. To use information technologies including the modern computer graphics technologies in professional area.</p> <p>CLO-7. To study and test heat and mass transfer equipments of heat power stations, to provide adjustment of equipment.</p> <p>CLO-8. To use normative regulations in professional activity.</p>
<b>Learning outcomes using value-motivational criterion</b>	<p>VMLO-1. To analyze social and personally significant problems, to set tasks and to choose their solutions.</p> <p>VMLO-2. To understand the role and importance of science and technology in the history of mankind, to respect cultural and religious values.</p> <p>VMLO-3. To argue own point of view based on laws of logic and philosophical principles.</p> <p>VMLO-4. To demonstrate basic knowledge in natural sciences, to use the main laws in professional activities, to apply the methods of mathematical analysis and simulation, theoretical and experimental study.</p> <p>VMLO-5. Ability to demonstrate and to use the knowledge of basic processes which take place in power machines and apparatuses at their designing.</p>
<b>Learning outcomes in the psychomotor sphere</b>	<p>PLO-1. To understand the essence of the problem arising during professional activity, to solve it using physical and mathematical instruments.</p> <p>PLO-2. To use the methods ensuring the safety and protection of personnel against accident consequence.</p> <p>PLO-3. To analyze scientific and technical information, to study domestic and foreign experiences in professional areas.</p> <p>PLO-4. To formulate the decisions, to generalize the obtained results and to represent the fulfilled work as a report.</p> <p>PLO-5. To estimate the production and nonproductive costs for quality assurance of the products.</p> <p>PLO-6. To control the processes quantitative characteristics based on the known methods.</p> <p>PLO-7. To make physical and numerical experiment, to develop stands for this.</p> <p>PLO-8. To develop the parts for new apparatuses taking into account the necessary requirements.</p> <p>PLO-9. To develop technical documentation in accordance</p>

	<p>with standard construction requirements.</p> <p>PLO-10. To take part in hardware design for heat power stations and others energetic power-plants devices taking into account environmental and security requirements.</p> <p>PLO-11. To comply with fire and safety rules, labor protection, and industrial sanitation norms.</p>
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**II. ACADEMIC DISCIPLINE DEFINITION / MODULES,**  
**will provide the planned learning outcomes and form of attestation for higher**  
**education students according to higher education standard**

**Table 1. The content of education programme profile by training cycles and forms of final control**

№ п/п	The subject	Credits	Hours	Semester	Trimester	Final control
<b>1. OBLIGATORY PART</b>						
1.1. General training cycle (to form generic competences)						
1.1.1	History of Ukraine	3,0	90	2	3,4	exam
1.1.2	Ukrainian language (for professional purposes)	3,0	90	5	9,10	exam
1.1.3	History of Ukrainian culture	2,0	60	2	3	exam
1.1.4	Philosophy	3,0	90	3	6	exam
1.1.5	Foreign language (for professional purposes)	5,0	150	1,2	1-4	exam
1.1.6	Higher mathematics	9,0	270	1-3	1-6	exam
1.1.7	Fundamentals of Information Technology and Programming	4,0	120	1,2	1-3	test
1.1.8	Physics	9,0	270	2,3	3-6	exam
1.1.9	Chemistry	3,0	90	2	3,4	test
1.1.10	Ecology	2,0	60	8	15	залік
1.1.11	Physical education					
<b>Total for cycle 1.1</b>		<b>43,0</b>	<b>1290</b>			
1.2. Professional training cycle (to form subject specific competences)						
1.2.1	Engineering and computer graphics	5,0	150	1	1,2	exam
1.2.2	Theoretical mechanics	4,0	120	4	7	д.залік
1.2.3	Electrical engineering and electronics	5,0	150	3	5,6	exam
1.2.4	Basics of labor protection	3,0	90	8	15	exam
1.2.5	Life Safety	2,0	60	4	8	залік.
1.2.6	Strength of Materials	4,0	120	4	8	exam
1.2.7	Material science and technology materials	4,0	120	1	2	exam
1.2.8	Mathematical methods and models in computer calculations of power equipment	6,0	180	6	11,12	exam
1.2.9	Fundamentals of design	4,0	120	5,6	10-12	exam
1.2.10	Hydro-gas dynamics	6,0	180	2-4	4-7	д.залік
1.2.11	Technical thermodynamics	8,0	240	4,5	7-10	exam

1.2.12	Heat and mass exchange	8,0	240	4,5	7-10	exam
1.2.13	Fuel and combustion	4,0	120	5,6	9-11	exam
1.2.14	Heating processes and installations	8,0	240	5,6	9-11	д.залік.
1.2.15	High-temperature thermal engineering processes and installations	6,0	180	6,7	12,13	д.залік
1.2.16	Design, installation and operation of heat engineering equipment	4,0	120	7,8	14,15	exam
1.2.17	Boiler installations of industrial enterprises	9,0	270	6,7	12-14	exam
1.2.18	Metrology, heat engineering measurements and devices	4,0	120	6	11,12	залік
1.2.19	Energy Economics	4,0	120	7	13	д.залік
1.2.20	Practical work	6,0	180	8	15	д.залік
1.2.21	Preparation of qualifying bachelor's work and state certification	9,0	270			
	<b>Total for cycle 1.2</b>	<b>113,0</b>	<b>3390</b>			
	<b>TOTAL for OBLIGATORY PART</b>	<b>156,0</b>	<b>4680</b>			
<b>2. SELECTIVE PART</b>						
<b>2.1. General training cycle (to form generic competences)</b>						
2.1.1	Politolgy	2,0	60	7	13	залік
2.1.2	Economic theory	2,0	60	5	9	д.залік
2.1.3	Science of law	2,0	60	7	14	залік
1.1.4	Philosophy	1,0	30	3	6	exam
1.1.5	Foreign language (for professional purposes)	3,0	90	1,2	1-4	exam
1.1.6	Higher mathematics	9,0	270	1-3	1-6	exam
1.1.7	Fundamentals of Information Technology and Programming	5,0	150	1,2	1-3	д.залік
1.1.8	Physics	3,0	90	2,3	3-6	exam
1.1.9	Chemistry	2,0	60	2	3,4	д.залік
	<b>Total for cycle 2.1</b>	<b>29</b>	<b>870</b>			
<b>2.2. Professional training cycle (to form subject specific competences)</b>						
2.2.1	Introduction to specialty	2,0	60	1	1	залік
2.2.2	Electrothermal installations	3,0	90	5	10	д.залік
2.2.3	Secondary and non-traditional energy resources and energy technology combinations	8,0	240	7,8	14,15	exam
2.2.4	Calculation methods and informatics in heat and power engineering	5,0	150	3	5,6	д.залік
2.2.5	Thermal power plants	4,0	120	8	15	exam
2.2.6	Heat supply sources and heat networks	7,0	210	6,7	11-13	exam
2.2.7	Energy production and distribution systems	4,0	120	7	13,14	exam
2.2.8	Power supply of industrial enterprises	4,0	120	4	7	залік
2.2.9	Machine parts	3,0	90	4	8	залік



1.2.9	Fundamentals of design	2,0	60	5,6	10-12	exam
1.2.10	Hydro-gas dynamics	4,0	120	2-4	4-7	д.залік
1.2.11	Technical thermodynamics	3,0	90	4,5	7-10	exam
1.2.12	Heat and mass exchange	4,0	120	4,5	7-10	exam
1.2.13	Fuel and combustion	2,0	60	5,6	9-11	exam
	<i>Total for cycle 2.2</i>	<b>55,0</b>	<b>1650</b>			
	<b>TOTAL for SELECTIVE PART</b>	<b>84,0</b>	<b>2520,0</b>			
	<b>TOTAL</b>	<b>240,0</b>	<b>7200</b>			

**Table 2. Generalized distribution of education programme profile content according to subjects part and training cycles**

№	Training cycle	The amount of training load for high education student (credits / %)		
		Obligatory components of education programme profile	Selective components of education programme profile	Total for the whole period of study
1.	General training cycle (to form generic competences)	43 / 17,9	29 / 12,1	72 / 30,0
2.	Professional training cycle (to form subject specific competences)	113 / 47,1	55 / 22,9	168 / 70,0
Total for the whole period of study		156 / 56	84 / 44	90 / 100

### III – Form of attestation of higher education students

<b>Final Examinations</b>	<p>To attain the Bachelor's degree there is a final exam, which consists of a public discussion of the students' thesis, which is their original work produced under the guidance of a supervisor.</p> <p>The student should demonstrate the competences and learning outcomes (see part II).</p> <p>The evaluation of Bachelor educational goals achievement is determined by the follow: State Examination Commission, methodological guideline for Bachelor's final exam.</p>
<b>Requirements for the Final Bachelor's thesis (by the presence)</b>	<p>The requirements for final Bachelor's thesis are presented in the special methodological guideline.</p> <p>The thesis volume (number of pages) and its structure is not regulated.</p> <p>The students need to have supervisor's response and Reviewer review to the final Bachelor's thesis, which confirms the work quality and check on plagiarism.</p>
<b>Requirements for State Qualification Exam (by the presence)</b>	
<b>Requirements for the public oral defense of a thesis (by the presence)</b>	<p>The requirements for oral public defense are presented in the documents of State Examination Commission and methodological guideline for Bachelor's final exam.</p>

#### IV – Requirements for internal quality assurance in higher education

The requirements are determined by Standards and Guidelines for Quality Assurance in the European Higher Education (ESG) and by Article 16 of the Law of Ukraine “On Higher Education”.

<b>Components of internal quality assurance in higher education</b>	<b>Definition, references and relevant documents</b>
<b>Principles and procedures of quality assurance in education</b>	<ul style="list-style-type: none"> <li>- the Law of Ukraine “On Higher Education” from 01.07.2014, No. 1556-VII;</li> <li>- Temporary provision about organization of education process in State Higher Educational Institution «Ukrainian State University of Chemical Technology» (order of the rector from 30.11.2015 No. 290);</li> <li>- Provision on a diploma with USUCT honors degree (order of the rector from 25.02.2016 No. 55);</li> <li>- The provision on the order of the exam commission in USUCT (order of the rector from 01.04.2015, No. 68);</li> <li>- Provision about development, approval and review of academic discipline programmes (order of the rector from 01.12.15 No. 291)</li> </ul>
<b>Monitoring and periodic revision of education programmes</b>	Annual monitoring of requirements of industry and labour market, revision of education programmes, education planes, work programmes of academic disciplines (order of the rector No.74 from 10.03.2016 )
<b>Annual evaluation of candidates for high education</b>	Provision about Rector’s control of education standards (order of the rector from 17.03.2014, No. №78)
<b>Annual evaluation of scientific and pedagogical personnel of higher Educational Institution</b>	Provision about Rector’s control commission of institution personnel pedagogical skill (order of the rector from 04.04.2016. No.85). Application of rating system for evaluation of scientific and pedagogical personnel activity in USUCT (order of the rector from 04.06.2010, No. 209 with the changes to the order from 09.06.2011, No. 147), Application of rating system for evaluation of chair and faculty activity in USUCT (order of the rector from 04.06.2010, No. 209). Publication of evaluation results at official Higher Educational Institution Web-site, at information stands, etc.

<b>Executive training of scientific and pedagogical personnel</b>	Executive training of scientific and pedagogical personnel is carried out according to provision approved by the order of Ministry of Education and Science of Ukraine №48 from 24.01.2013 and provisions of executive training of scientific and pedagogical personnel of State Higher Educational Institution «Ukrainian State University of Chemical Technology» (order of the rector from 28.05.2016 No. 105)
<b>Availability of the necessary resources for organization of education process</b>	Educational and methodical, material and technical, and personnel support meets the educational license terms (Decree of Cabinet of Ministers No.1187 from 30.12.2015.). License series AE №636496. Certificates in the field of education knowledge and specialization.
<b>Availability of information systems for effective management of education process</b>	Temporarily provision about management of educational process in the State Higher Educational Institution «Ukrainian State University of Chemical Technology» (order of the rector No.290 from 30.11.2015) is supported by information-analytical system for education process control, which is consists of subsystems: Applicant, Education process.
<b>Publicity of information about education programmes, degrees in higher education and qualifications</b>	Information about education programmes, degrees in higher education and qualifications is public and it is fully represented at official Higher Educational Institution Web-site: <a href="http://udhtu.com.ua">http://udhtu.com.ua</a>
<b>Academic Plagiarism Prevention and Detection</b>	Evaluation of students' knowledge and checking for plagiarism in thesis and students' research works is carried out by university lecturer in the established order using the relevant software