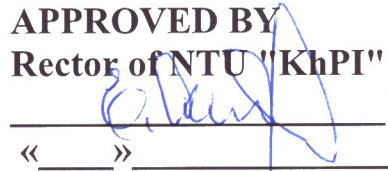


**MINISTRY OF EDUCATION AND SCIENCE OF
UKRAINE**

**NATIONAL TECHNICAL UNIVERSITY
"KHARKIV POLYTECHNIC INSTITUTE"**

**APPROVED BY
Rector of NTU "KhPI"**



« ____ » _____ **Yevhen Sokol
2023**

**EDUCATIONAL AND PROFESSIONAL PROGRAM
"ELECTRIC DRIVE, MECHATRONICS AND ROBOTICS"
second (master's) level of higher education**

by specialty 141 «Electric Power engineering, electrical engineering and
electromechanics»

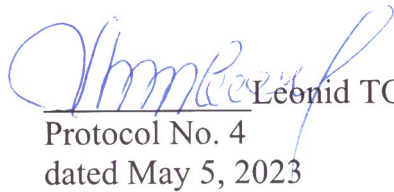
Field of knowledge 14 «Electrical engineering»

Qualification Master of Electric Power Engineering, Electrical Engineering and
Electromechanics

APPROVED

**BY THE ACADEMIC COUNCIL OF NTU
"KHPI"**

Chairman of the Academic Council



Leonid TOVAZHNIANSKY
Protocol No. 4
dated May 5, 2023

Kharkiv 2023.

LETTER OF APPROVAL

Educational and professional program "Electric drive, mechanics and robotics"

Level of higher education second (master's)

Field of knowledge 14 "Electrical engineering"

Specialty 141 "Electric power engineering, electrical engineering and electromechanics"

Qualification - Master of Electric Power Engineering, Electrical Engineering and Electromechanics

APPROVED

working group of the OP in the specialty 141
"Electric power engineering, electrical
engineering and electromechanics"

Guarantor of the educational program



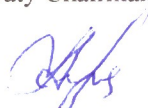
Vira Shamardina

April 28, 2023.

RECOMMENDED

Methodological Council of NTU "KhPI"

Deputy Chairman of the Methodological Council



Ruslan Migushchenko

April 28, 2023.

APPROVED

Head of the Department of Automated
Electromechanical Systems

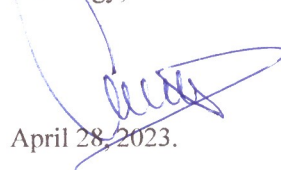


Bogdan Vorobyov

April 17, 2023.

APPROVED

Director of the Educational and Research Institute
of Energy, Electronics and Electromechanics

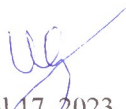


Roman TOMAHEVSKY

April 28, 2023.

APPROVED

student of group E-N322b (member of the working
group of the educational program)



Yaroslav MERKULOV

April 17, 2023.

REVIEWERS:

Productive remarks and feedback on the draft of the educational and professional program were received from:

1. Gennady Rudenko. NORMATECH GROUP LLC, Director _____
2. Anastasiia Tkachenko, Volt LLC, Deputy Director

PREFACE

Developed by the working group to support the educational and professional program "Electric drive, mechatronics and robotics", specialty 141 "Electric power engineering, electrical engineering and electromechanics" of the Educational and Research Institute of Energy, Electronics and Electromechanics of the National Technical University "Kharkiv Polytechnic Institute" on the basis of the draft higher education standard developed by the scientific and methodological subcommittee of the Ministry of Education and Science of Ukraine in the specialty 141 "Electricity, Electrical Engineering and Electromechanics"

in the structure:

guarantor of the educational program

Shamardina Vira Mykolaivna, Candidate of Technical Sciences, professor of the Department of Automated Electromechanical Systems;

members of the working group of the educational and professional program:

1. Asmolova Larisa Valeriivna, Candidate of Technical Sciences, assoc. prof. of the Department of automated electromechanical systems
2. Kutovyi Yuriy Mykolaiovych, Candidate of Technical Sciences, Professor of the Department of Automated Electromechanical Systems;
3. Merkulov Yaroslav, student of group E-N322b.

PROFILE OF THE EDUCATIONAL PROGRAM IN THE SPECIALTY

1 - General information	
Higher educational institution and structural unit	National Technical University "Kharkiv Polytechnic Institute" Educational and scientific institute of power engineering, Electronics and Electromechanics Department: automated electromechanical systems
Degree of higher education and title of qualification in the original language	Degree of higher education - master's degree Educational qualification - master's degree in power engineering, electrical engineering and electromechanics Qualification in the diploma - according to the current standard
The official name of the educational programs	Educational and professional program of the second (master's) level higher education
Diploma type and scope of the educational program	Master's degree, single, 90 ECTS credits, term of study 1 year 4 months
Availability of accreditation	Accreditation Commission. Ukraine. Certificate - HД №2192144. Expiration date - 01.07.2026
Cycle/level	Second (master's) level of higher education; HPK of Ukraine - 8 level; FQ-EHEA - second cycle; EQF-LLL – 7 level
Background	Bachelor's degree. The rest of the requirements are determined by the rules of admission to the master's degree program.
Language(s) of instruction	Ukrainian
The term of action educational programs	According to the validity period of the accreditation certificate
Internet address of the permanent placement of the description of the educational program	http://blogs.kpi.kharkov.ua/v2/quality/osvitni-programy-magistr/
2 - Objective of the educational program	
Education of specialists of the second master's level in the system of innovative elite education of the University is in line with the mission to <i>promote the harmonious development of the individual and to ensure the education of a new generation of professionals capable of combining research, design and entrepreneurial activities in a comprehensive manner through deep mastery of fundamental knowledge, study of engineering, mastery of engineering creativity and entrepreneurial skills.</i> Acquisition of theoretical knowledge, practical skills, abilities and competencies sufficient for the successful performance of professional duties in the specialty 141 "Electric Power Engineering, Electrical Engineering and Electromechanics" and to prepare students for further employment in the chosen specialty in the subject area "Electrical Engineering", development of programs of the next levels (Doctor of Philosophy) for researchers. The achievement of this goal is based on the principles of continuity and individualization of education, fundamental and integrity of knowledge, practical orientation and awareness of the place of the acquired competencies, and the symbiosis of scientific and systemic approaches.	

3 - Characteristics of the educational program	
Subject area (field of knowledge, specialty, specialization (if any))	Field of knowledge: 14 "Electrical engineering" Specialty: 141 "Electric power engineering, electrical engineering and electromechanics" Specialized packages of disciplines: 01 "Electromechanical automation systems and electric drive" 02 "Mechatronics and Robotics. • Objects of activity: scientific institutions, institutions and organizations in the field of electric power, electrical engineering and electromechanics, enterprises of the electric power complex, electrical engineering and electromechanical companies, electrical engineering and electromechanical services of organizations. • Objects of study: processes of production, transmission, distribution and consumption of electric energy at power plants, in electrical networks and systems, by industrial and domestic consumers; processes of electric energy conversion in electromechanical systems; analysis of safety, reliability and service life of electric power, electrical and electromechanical equipment. • The learning objectives are to train specialists capable of constructing, designing, operating, ensuring a culture of safety, performing installation, commissioning, and repair, creating new equipment and introducing the latest technologies, conducting research, and teaching. Acquiring competencies sufficient to effectively perform complex professional tasks and innovative tasks in the field of electricity, electrical engineering and electromechanics. • The theoretical content of the subject area is fundamental knowledge in the field of electrical engineering, modeling and optimization of electric power, electrical engineering and electromechanical systems and complexes, their use for innovation and research of the processes of operation of electric power, electrical engineering and electromechanical objects. • Methods, tools and technologies - methods and tools for studying processes in equipment in electric power and electromechanical systems and complexes, automated design and operation. Analytical calculation methods using specialized laboratory equipment, personal computers, and other equipment. • Tools and equipment - control and measuring instruments, electrical and electronic devices, microcontrollers, computers, modern information technologies, management, operation, control and monitoring systems.
Orientation of the educational program	The educational and professional master's program has an applied professional orientation, focuses on relevant individual trajectories within which further professional and scientific careers are possible: electromechanical automation systems and electric drive, mechatronics and robotics.
Main focus of the educational program and specializations	General, special education and professional training in the field of electric power, electrical engineering and electromechanics with the possibility of acquiring the necessary research skills for further study or for a scientific and professional career.

	Keywords: electric power, electrical and electromechanical systems, complexes and devices, control systems, electric drive, mechatronics, robotics.
Program features	The program is focused on professional engineering activities. During the master's program, students have the opportunity to participate in a scientific and technical conference and have scientific publications. The key aspect of the program is a broad elective component of training in specialized blocks that correspond to the main processes of energy-efficient electricity consumption, digitalization and intelligent control in electrical and electromechanical systems. Mastering the fundamental and professionally oriented educational components together ensures the acquisition of the necessary competencies for further professional activities in the electrical industry. The uniqueness of the educational program is also due to the powerful educational and scientific laboratory base used in the training of applicants, as well as the availability of a wide network of practice bases at enterprises and organizations in the industry. The educational program provides for teaching in a foreign language.
4 - Suitability of graduates for employment and further education	
Suitability for employment	Graduates can work in industrial enterprises of the electric power, electrical and electromechanical industries and are able to hold positions of specialists and managers in the services of chief power engineer, chief mechanic, chief designer, chief technologist in electrical and electromechanical workshops and departments, in industry research, design and design and development organizations and institutions; in research institutes of the National Academy of Sciences of Ukraine, higher education institutions of the Ministry of Education and Science of Ukraine, and research centers. The list of positions corresponds to the current qualification of professions in the electric power, electrical and electromechanical industries. Types of economic activity according to DK003:2010.
Further education	Opportunity to study under the program of the third (educational and scientific) level of higher education FQ-EHEA, 8 level EQF-LLL and 8 level NQF on a competitive basis and continue studying abroad for a doctorate and to improve their qualifications at the master's level in the system of postgraduate training.
5 - Teaching and assessment	
Teaching and learning	Student-centered learning, distance learning in the Office 365 system, learning through laboratory practice, research-based learning, self-study. Teaching is conducted in the form of lectures, multimedia lectures, seminars, practical classes, and laboratory work. There is also independent work with the possibility of consultations with the teacher on individual educational components, individual classes, group project work, learning technologies in cooperation, completion of course projects (works) and final qualification work.
Evaluation	Rating system, oral and written exams, testing. It provides for the current control of students' knowledge, semester control in the form of a differentiated test or exam, defense of course projects (works), practice reports, and defense of the final qualification work. The grading system involves the application of the international ECTS system (with grades A, B, C, D, E, F), the national

	system (with grades “excellent”, “good”, “satisfactory” and “unsatisfactory”), as well as the 100-point system of the higher education institution with an established system of compliance.
6 - Program competencies	
Integral competence	Ability to solve complex specialized tasks and solve practical problems, including innovative ones, in the course of professional activities in the field of electricity, electrical engineering and electromechanics or in the process of studying, which involves the application of theories and methods of electrical engineering and electromechanics and is characterized by complexity and uncertainty of conditions.
General competencies (defined by the draft standard of higher education of the specialty)	K01. Ability to think abstractly, analyze and synthesize. K02. Ability to use a foreign language for professional, scientific and technical activities and communication. K03. Ability to search, process and analyze information from various sources. K04. Ability to use information and communication technologies. K05. Ability to apply knowledge in practical situations, work independently and in a team. K06. Ability to generate new ideas, make informed decisions, demonstrate creativity and systematic thinking, identify and assess risks.
Special (professional) competencies of the specialty (including those defined by the draft standard of higher education of the specialty)	K07. Ability to demonstrate awareness of intellectual property issues in the field of electricity, electrical engineering and electromechanics. K08. Ability to understand and take into account philosophical, social, environmental, ethical, economic and commercial considerations that affect the implementation of technical solutions in electricity, electrical and electromechanical engineering. K09. Ability to manage projects and critically evaluate their results. K10. Ability to use the acquired knowledge and skills to work in the subject area and understand the need to comply with safety rules when performing job duties in the electric power industry, electrical engineering and electromechanics. K11. Ability to demonstrate an understanding of regulations, norms, rules and standards in the electric power industry, electrical engineering and electromechanics. K12. Knowledge and understanding of the patterns, mechanisms and consequences of equipment failures, the ability to develop and implement measures to improve reliability, efficiency and safety in the design and operation of equipment and facilities in the electric power industry, electrical engineering and electromechanics. K13. Awareness of the need to constantly expand one's own knowledge of new technologies in the electric power industry, electrical engineering and electromechanics. K14. Knowledge and understanding of modern technological processes and systems of technological preparation of production, technical

	characteristics, design features, purpose and rules of operation of electric power, electrical and electromechanical equipment and machinery. K15. Ability to apply the acquired theoretical knowledge, scientific and technical methods and appropriate software to solve scientific and technical problems and conduct research in the field of electricity, electrical engineering and electromechanics. K16. Ability to apply existing and develop new methods, techniques, technologies and procedures for solving engineering problems, including in the design and operation of electric power, electrical engineering and electromechanics facilities. K17. Ability to apply analytical methods of analysis, mathematical modeling and perform physical, mathematical and computational experiments to solve engineering problems and conduct scientific research. K18. Ability to apply information and communication technologies and programming skills to solve typical problems of engineering and scientific activities in the electric power industry, electrical engineering and electromechanics. K19. Ability to use the acquired knowledge and skills to conduct research at the appropriate level. K20. Ability to prepare and publish the results of their research in scientific professional journals. K21. Ability to adapt and act in a new situation, apply effective strategies and tools to solve cognitive problems. K 22. Ability to analyze the current state and determine trends in the development of electric drive systems and automatic control theory, numerical control systems for mechatronic systems, metal-cutting machines, industrial and mobile robots. K 23. Ability to use modern methods of mathematical apparatus in the design of electromechanical and mechatronic systems and microprocessor control systems for electric drives. K 24. Ability to apply the principles of increasing energy efficiency in electric drive systems of industrial enterprises. K 25. Ability to develop and calculate schemes of electrical installations for various purposes, determine the composition of their equipment and calculate their operating modes. K 26. Ability to use modern means of computing, communication and communication in the technical calculations of enterprise automation and the design of mechatronic systems and modules. K 27. Ability to use modern methods of design and calculation of individual mechatronic systems and modules and methods of mathematical and computer modeling to study dynamic characteristics of mechatronic and robotic systems.
7 - Learning outcomes	
Learning outcomes for specialty (including the specialties defined by the draft higher education standard)	PR01. Find options for improving energy efficiency and reliability of the electric power industry, electrical engineering and electromechanical equipment and related complexes and systems. PR02. Reproduce processes in electric power, electrical and electromechanical systems in their computer modeling. PR03. Master new versions or new software designed for computer modeling of objects and processes in electric power, electrical and electromechanical systems. PR04. Determine a plan of measures to improve the reliability, safety of operation and service life of electric power, electrical and electromechanical equipment and related complexes and systems. PR05. Analyze processes in electric power, electrical and electromechanical equipment and related complexes and systems.

	PR06. To master the methods of mathematical and physical modeling of objects and processes in electric power, electrical and electromechanical systems. PRO07. Take into account philosophical, legal and economic aspects of scientific research and innovation. PRO08. Search for sources of resource support for additional training, research and innovation activities. PR09. To present research materials at international scientific conferences and seminars devoted to modern problems in the field of electric power, electrical engineering and electromechanics. PRO10. Adhere to the principles and rules of academic integrity in educational and scientific activities. PRO11. Demonstrate an understanding of regulations, norms, rules and standards in the field of electricity, electrical engineering and electromechanics. PR12. To communicate fluently orally and in writing in the state and foreign languages on modern scientific and technical problems of electric power, electrical engineering and electromechanics. PR13. Protect own intellectual property rights and respect similar rights of others, apply the system of legal protection and property rights of intellectual property. PR14. Reconstruct existing power grids, stations and substations, electrical and electromechanical complexes and systems to improve their reliability, operational efficiency and service life. PR15. Solve professional problems in the design, installation and operation of electric power, electrical, electromechanical complexes and systems. PR16. To master new methods of synthesis of electric power, electrical and electromechanical installations and systems with specified parameters. PR17. Combine empirical and theoretical research methods to find ways to reduce electricity losses during its production, transportation, distribution and use. PR18. Analyze the current state and identify trends in the development of electric drive systems and automatic control theory, systems numerical control of mechatronic systems, metal-cutting machines, mobile and industrial robots. PR19. To be able to use modern methods of mathematical apparatus in the design of electromechanical systems, microprocessor control systems for electric drives of mechatronic systems. PR20. Know the ways and principles of improving the energy efficiency of electric drive systems of industrial enterprises. PR21. To be able to apply modern means of computer technology, communication and communication in carrying out technical calculations of enterprise automation and design of mechatronic systems and modules. PR22. To be able to use modern methods of design and calculation of individual mechatronic systems and modules and methods of mathematical and computer modeling to study dynamic characteristics of mechatronic and robotic systems.
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8 - Resource support for the program implementation	
Staffing of the company	In accordance with the staffing requirements for ensuring the implementation of educational activities approved by the Resolution of the Cabinet of Ministers of Ukraine dated December 30, 2015 No. 1187 (as amended by the Resolution of the Cabinet of Ministers of Ukraine dated March 24, 2021 No. 365): scientific and pedagogical staff who provide the educational and professional program by qualification correspond to the profile and direction of the disciplines taught, have the necessary teaching experience and practical experience. In the process of organizing the educational process, professionals with experience in research/management/innovation/creative work and/or work in their specialty are involved. 100% of teachers who provide educational activities in English have certificates in accordance with the Common European Framework of Reference for Languages (at level B2) or qualification documents related to the use of a foreign language.
Logistical support	In accordance with the technological requirements for the material and technical support of educational activities, approved by the Resolution of the Cabinet of Ministers of Ukraine of December 30, 2015, No. 1187 (as amended by the Resolution of the Cabinet of Ministers of Ukraine of March 24, 2021, No. 365), the material and technical support allows to fully ensure the educational process throughout the entire cycle of training under the educational program. The condition of the premises is certified by sanitary and technical passports that comply with applicable regulations. Use of multimedia equipment, networked IT technologies and distance learning platforms
Material and technical support	The information and educational and methodological support of the educational program complies with the Resolution of the Cabinet of Ministers of Ukraine dated 30.12.2015 No. 1187 "On Approval of the Licensing Conditions for the Conduct of Educational Activities of Educational Institutions" (as amended by the Resolution of the Cabinet of Ministers of Ukraine No. 365 dated 24.03.2021). Information support is provided by textbooks, manuals, etc. and electronic resources (the library has at least five titles of domestic and foreign professional periodicals and publications of the relevant or related profile, including in electronic form). The use of modern scientific technical library of NTU "KhPI".
9 - Academic mobility	
National credit mobility	On the basis of bilateral agreements between the National Technical University "Kharkiv Polytechnic Institute" and higher education institutions of Ukraine
International credit mobility	On the basis of bilateral agreements between the National Technical University "KhPI" and educational institutions of partner countries within the framework of international academic mobility, which provides for integrated training, double diplomas, etc. In order to create conditions for international academic mobility, a higher education institution has the right to decide to teach one / several / all disciplines in English and/or other foreign languages, while ensuring that higher education students know the relevant discipline in the state language. language.

Training of foreigners of higher education students	According to the license of NTU "KhPI", the educational program can foreigners and/or stateless persons can study. Educational plans for this contingent include extended language training in the Ukrainian language. In order to create conditions for international academic mobility a higher education institution has the right to make a decision on teaching one/several/all disciplines in English and/or other in foreign languages, providing while at the same time knowledge by applicants for higher education in the relevant discipline by the state language. For teaching academic disciplines in a foreign language (English) separate groups for foreign citizens and persons are formed in the language stateless persons who wish to pursue higher education at the expense of individuals or legal entities, or develop individual program. At this program institutions of higher education ensure that such persons learn the state language as a separate academic discipline.
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2. LIST OF EDUCATIONAL COMPONENTS OF THE EDUCATIONAL AND PROFESSIONAL PROGRAM “ELECTRIC DRIVE, MECHATRONICS AND ROBOTICS” AND THEIR LOGICAL SEQUENCE

2.1. List of components of the educational and professional program

Code n/a	Components of the educational program (academic disciplines, course projects (works)), practice, qualification work)	Number of credits	The form of the final control
1	2	3	4
Mandatory components of the educational and professional program			
3П 1	Intellectual property	3	Differential credit
3П 2	Innovative entrepreneurship and startup project management	3	Differential credit
3П 3	Foreign language for professional purposes	3	Differential credit
СП 1	Occupational health and safety	3	Differential credit
СП 2	Reliability and diagnostics	5	Examination
СП 3	Problems and prospects for development electric power engineering and electromechanics	4	Examination
СП 4	Fundamentals of scientific research	4	Differential credit
СП 5	Research and development practice	15	Differential credit
СП 6	Certification	15	
The total amount of mandatory components:		55	
Selective components of the educational and professional program			
The specialized package of disciplines 01 " Electromechanical systems of automation and electric drive"			
БП1.1	Numerical program control of mechatronic systems part 1	3	Examination
БП1.2	Mobile mechatronic and robotic systems	5	Examination
БП1.3	Energy saving by means of electric drive	4	Examination
БП1.4	Numerical program control of mechatronic systems part 2	3	Examination
	Together:	15	
Specialized package of disciplines 02 "Mechatronics and robotics"			
БП2.1	Numerical program control of mechatronic systems part 1	3	Examination
БП2.2	Mobile mechatronic and robotic systems	5	Examination
БП2.3	Design of mechatronic systems	4	Examination
БП2.4	Numerical program control of mechatronic systems part 2	3	Examination
	Together:	15	
Disciplines of free choice for students of specialized training			
ББП1	Modeling and problems of synthesis of microprocessor-based electric drives	5	Examination

BBII2	Modeling of microprocessor-based electric drives robotic and mechatronic systems	5	Examination
BBII3	Optimization of control processes in electromechanical and mechatronic systems	5	Examination
BBII4	Modern methods of controlling electric drives alternating current	6	Examination
BBII5	Modern methods of controlling mechatronic drives systems	6	Examination
BBII6	Digital control technologies in electromechanical and mechatronic systems	6	Examination
BBII7	Microprocessor-based electric drive	3	Differential credit
BBII8	Electric drive of mechatronic systems with microprocessor control	3	Differential credit
BBII9	Household electrical equipment	3	Differential credit
BBII10	Intelligent control systems	3	Examination
BBII11	Intelligent control systems in mechatronics	3	Examination
BBII12	Autonomous power supply systems	3	Examination
BBII13	Design of microprocessor-based devices automation in the electric drive	3	Differential credit
BBII14	Dynamics of mechatronic and robotic systems	3	Examination
BBII15	Information and communication tools electromechanical and mechatronic systems	3	Exam
	Together:	20	
Total volume of sample components:		35	
TOTAL VOLUME OF THE EDUCATIONAL PROGRAM		90	

DISTRIBUTION OF THE CONTENT OF THE EDUCATIONAL PROGRAM BY GROUPS OF COMPONENTS AND TRAINING CYCLES

Training based on the level of bachelor's degree

No · s/n	Preparation cycle	The amount of academic workload of a higher education student (ESTS loans / %)		
		Mandatory components of the educational professional programs	Selective components of educational and professional programs	Total for the entire term of study
1	General preparation	9 / 10		9 / 10
2	Special (professional) training	46 / 51		46 / 51
3	Disciplines of free choice	-	35 / 39	35 / 39
Total for the entire period of study		55 / 61	35 / 39	90 / 100

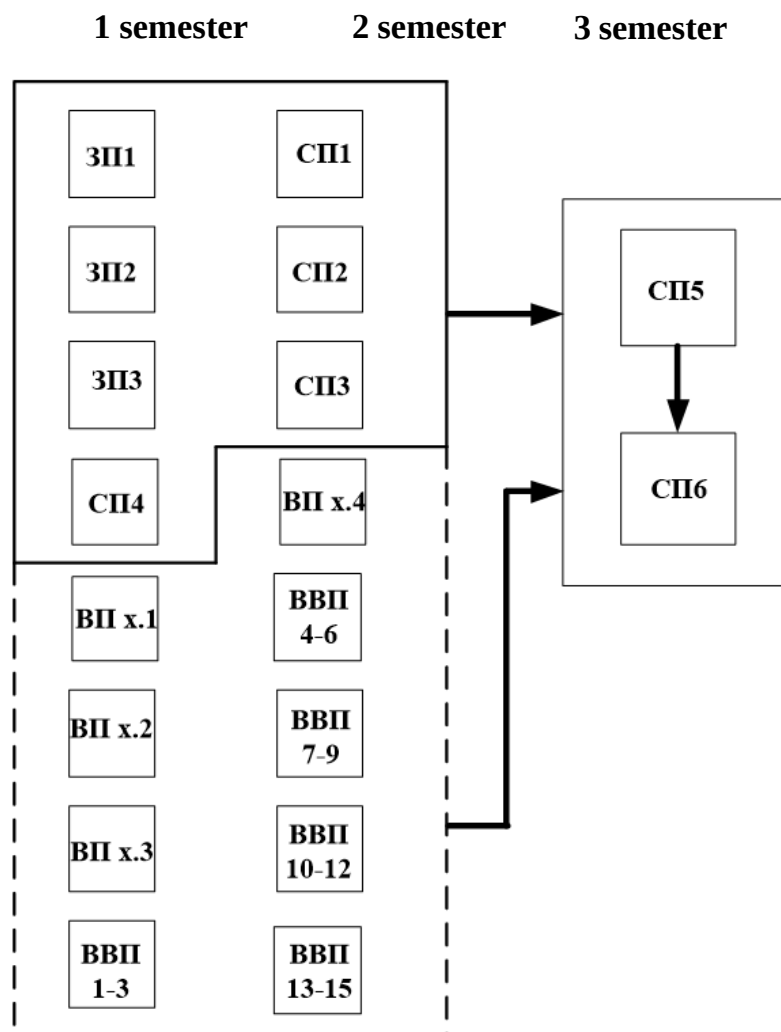
FORM OF CERTIFICATION OF HIGHER EDUCATION APPLICANTS

Certification of graduates of the educational program of specialty 141

"Electric Power Engineering, Electrical Engineering and Electromechanics" is conducted in the form of a public defense of a qualifying master's thesis and ends with the issuance of a standardized document on the award of a master's degree with the qualification "Master of Electric Power Engineering, Electrical Engineering and Electromechanics". The qualification work is checked for academic plagiarism using software and hardware. Publication of the qualification work in the repository of NTU "KhPI". The public defense of the qualification work takes place at an open meeting of the certification commission.

The qualification work must present a solution to a complex specialized task or practical problem in the field of electricity, electrical engineering and electromechanics, which involves research and/or innovation and is characterized by uncertainty of conditions and requirements.

2.2. Structural and logical diagram of the educational and professional program



* X - number of the profile block

3. Matrix of correspondence of program competencies to the components of the educational program

	ЗП1	ЗП2	ЗП3	СП1	СП2	СП3	СП4	СП5	СП6
K01					•	•	•	•	•
K02			•					•	•
K03	•	•				•	•	•	•
K04	•	•	•	•	•	•	•	•	•
K05	•	•	•	•	•	•	•	•	•
K06	•	•			•	•	•	•	•
K07	•	•						•	•
K08		•		•				•	•
K09		•						•	•
K10				•				•	•
K11		•		•				•	•
K12					•			•	•
K13						•	•	•	•
K14					•	•	•	•	•
K15					•	•		•	•
K16		•			•	•		•	•
K17					•	•	•	•	•
K18		•		•	•	•	•	•	•
K19						•	•	•	•
K20								•	•
K21						•	•	•	•
K22						•		•	•
K23						•		•	•
K24						•		•	•
K25						•		•	•
K26						•		•	•
K27						•		•	•

4. Matrix for ensuring program learning outcomes with relevant components of the educational program



	ЗП1	ЗП2	ЗП3	СП1	СП2	СП3	СП4	СП5	СП6
ПР01					•			•	•
ПР02					•		•	•	•
ПР03					•	•	•	•	•
ПР04					•			•	•
ПР05					•	•	•	•	•
ПР06					•	•	•	•	•
ПР07	•	•						•	•
ПР08	•	•			•	•	•	•	•
ПР09							•	•	•
ПР10	•	•	•	•	•	•	•	•	•
ПР11		•		•				•	•
ПР12	•	•	•	•	•	•	•	•	•
ПР13	•	•						•	•
ПР14					•			•	•
ПР15						•	•	•	•
ПР16					•	•		•	•
ПР17								•	•
ПР18								•	•
ПР19					•			•	•
ПР20						•		•	•
ПР21								•	•
ПР22								•	•

