

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL TECHNICAL UNIVERSITY OF UKRAINE
«IGOR SIKORSKY KYIV POLYTECHNIC INSTITUTE»**

APPROVED

Chairman of the Academic Council of
Igor Sikorsky Kyiv Polytechnic Institute

_____ M.Z. Zgurovsky

«__» _____ 20__ p.

EDUCATIONAL AND SCIENTIFIC PROGRAM

**Electrotechnical devices and electrotechnological
complexes**

**The third (educational and scientific) level of higher
education**

specialty	141 - "Electric power engineering, electrical engineering and electromechanics"
field of knowledge	14 - "Electrical Engineering"
qualification	Doctor of Philosophy in Electric Power Engineering, Electrical Engineering and Electromechanics

Approved at the meeting of the
Academic Council of the University
from "_02_" __04__2018, Protocol No. 4

PREFACE

Developed by the working group:

Chairman of the working group

Brzezyski Volodymyr Oleksandrovych, Doctor of Technical Sciences,
Professor, Professor of the Department of Theoretical Electrical Engineering _____

Working group members:

Ostroverkhov Mykola Yakovych, Doctor of Technical Sciences, Professor,
Head of the Department of Theoretical Electrical Engineering _____

Trotsenko Yevgeniy Olexandrovich, Ph.D., Associate Professor, Associate
Professor of Theoretical Electrical Engineering _____

Head of the Department of Theoretical Electrical Engineering

Ostroverkhov Mykola Yakovych, Doctor of Technical Sciences, Professor,
Head of the Department of Theoretical Electrical Engineering _____

Chairman of the scientific and methodological subcommittee of the university in the specialty

Yandulsky Olexander Stanislavovich, Doctor of Technical Sciences,
Professor, Dean of the Faculty of Electric Power Engineering and Automation _____

The educational program is considered and approved by the Methodical Council of the University
(Protocol No. __7__ from "_29_" _03__ 2018_)

Chairman of the Methodical Council

_____ Yu.I. Yakimenko

Scientific Secretary of the Methodical Council

_____ V.P. Golovenkin

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11. PROFILE OF THE EDUCATIONAL PROGRAM IN THE SPECIALTY 141 - "ELECTRIC POWER, ELECTRICAL ENGINEERING AND ELECTROMECHANICS"

1 - General information	
Full name of the higher education institution and institute / faculty	National Technical University of Ukraine «Ihor Sikorsky Kyiv Polytechnic Institute», Faculty of Electrical Engineering and Automation
Higher education degree and title of qualification in the original language	Degree - Doctor of Philosophy Qualification - Doctor of Philosophy in Electric Power Engineering, Electrical Engineering and Electromechanics
Level with NRC	NRC of Ukraine - level 9
The official name of the educational program	Electrotechnical devices and electrotechnological complexes
Type of diploma and scope of educational program	Diploma Ph.D. , 30 credits of educational component, 210 credits of scientific component, term of study 4 years
Availability of accreditation	Accredited for the first time
Prerequisites	The presence of a master's degree
Language (s) of instruction	Ukrainian / English
Term of the educational program	Until the next accreditation
Internet address constant locating educational programs	https://toe.fea.kpi.ua/download/files/onp_phd_etpetk.pdf
2 - The purpose of the educational program	
Training of a specialist capable of solving complex problems in electric power, electrical engineering and electromechanics and / or research and innovation, which involves a deep rethinking of existing and the creation of new holistic knowledge and / or professional practice.	
3 - Characteristics of the educational program	
Subject area (field of knowledge, specialty)	Field of knowledge: 14 - "Electrical Engineering" Specialty: 141 - "Electric power, electrical engineering and electromechanics"
Orientation of the educational program	Educational and scientific
The main focus of the educational program and specialization	Special education in the field of power engineering, electrical engineering and electromechanics Keywords: electromagnetic compatibility, electrical devices, electrotechnological complexes

4 - Suitability of graduates for employment and further study	
Suitability for work is the device	According to the classifier of professions DK003: 2010 graduates can perform various types of professional work. Professional certification is possible.
Further training	Graduates have the right to continue their studies at the scientific level of higher education
5 - Teaching and assessment	
Teaching and learning	Lectures, practical and seminar classes, computer workshops and laboratory works; technology of blended learning, practice; execution of the dissertation
Evaluation	The rating system of evaluation, oral and written examinations, test at ing
6 - Program competencies	
Integral competencies Mr. t nist	The ability of a person to solve complex problems in power engineering, electrical engineering and electromechanics and / or research and innovation, which involves a deep rethinking of existing and the creation of new holistic knowledge and / or professional practice.
General Competences (GC)	
ZK 1	Ability to abstract thinking, analysis and synthesis.
ZK 2	Ability to conduct research at the appropriate level.
ZK 3	Ability to generate new ideas (creativity).
ZK 4	Ability to identify, pose and solve problems.
ZK 5	Ability to show initiative and entrepreneurship.
ZK 6	Skills of strict observance of professional ethics.
ZK 7	The desire to constantly expand the general cultural worldview.
ZK 8	Ability to communicate in the state language both orally and in writing.
ZK 9	Ability to orally and in writing present the results of their own research.
ZK 10	Ability to use modern information technologies in scientific activities, search and critical analysis of information.
ZK 11	Ability to manage research projects and / or make proposals for research funding, registration of intellectual property rights.
ZK 12	Ability to communicate in a foreign language (English or another according to the specifics of the specialty) to a sufficient extent to present and discuss the results of their scientific work orally and in writing, as well as for full understanding of foreign scientific texts in the specialty.
ZK 13	Ability to work in an international context.
Professional competencies of the specialty (PC)	
FC 1	Ability to demonstrate knowledge and understanding of scientific facts, concepts, theories, principles and methods of experimental computer science.
FC 2	Ability to apply a systematic approach to solving scientific and technical problems of power engineering, electrical engineering and electromechanics.
FC 3	Ability to demonstrate an understanding of the specifics of power engineering, electrical engineering and electromechanics as a science and be able to properly apply it when working with technical literature and other sources of information.
FC 4	Ability to analyze, discuss and evaluate scientific papers and projects in the field of power engineering, electrical engineering and electromechanics.
FC 5	Ability to apply appropriate mathematical methods, computer technology, as well as the principles of standardization and certification to solve problems in the field of power engineering, electrical engineering and electromechanics.
FC 6	Ability to apply a comprehensive approach to solving experimental problems with the use of information and measurement technology and application software.
FC 7	Ability to analyze technical and economic indicators and examination of design decisions in the field of power engineering, electrical engineering and electromechanics using

	computer simulation.
FC 8	Ability to develop software and hardware for computerized information and measurement systems.
FC 9	Ability to implement the latest advances in the design of automated production and automated development or design of elements of power, electrical and electromechanical systems.
FC 10	Ability to demonstrate practical skills in the field of power engineering, electrical engineering and electromechanics.
FC 11	Ability to demonstrate understanding of technical aspects of reliability and efficiency of educational program of electric power, electrotechnical and electromechanical objects and systems.
FC 12	Ability to manage projects and control the quality of their implementation.
FC 13	Possession of skills of planning and management of the process of commercialization of an intellectual product and assessment of risks of commercialization of research results.
FC 14	Ability to demonstrate an understanding of the requirements for the reliability and efficiency of educational program of electrical, electrical and electromechanical facilities and systems due to the need to ensure sustainable development.
FC 15	Ability to manage projects and startup projects and evaluate their results.
FC 16	Ability to demonstrate awareness of intellectual property issues.
FC 17	Ability to organize jobs, their technical equipment, organization and planning of the team of performers, making managerial decisions in the context of dissenting educational program in innovations and professional discussion.
FC 18	Ability to formulate and correctly set tasks and manage technical staff; to coordinate the work of technical and management units of the organization, as well as to take an active part in staff training.
FC 19	Ability to demonstrate systematic knowledge on the organization of the pedagogical process in higher education institutions and the use of pedagogical technologies in higher education; demonstrate basic knowledge of pedagogy and psychology of higher education.
FC 20	Ability to practical application of theoretical foundations of pedagogical activity; ability to carry out systematic analysis of educational processes and phenomena; methodical readiness to teach a set of special disciplines in the process of training specialists in power engineering, electrical engineering and electromechanics.

7 - Program learning outcomes

KNOWLEDGE	
ZN 1	General scientific philosophical concept of scientific worldview, the role of science, the explanation of its influence on social processes.
ZN 2	State language, both oral and written, for professional activities.
ZN 3	Foreign language, including special terminology, to present and discuss scientific results in English or one of the languages of the European Union in oral and written forms, as well as to conduct a scientific discussion.
ZN 4	Modern methods of conducting research, organization and planning of the experiment, computerized research methods and processing of measurement results.
ZN 5	Basic concepts of measurement theory, their application in practice and in computer modeling of objects and phenomena.
ZN 6	Forecasting development trends in the field of power engineering, electrical engineering and electromechanics.
ZN 7	Methods of analysis of engineering products, processes and systems according to the established criteria, selection and application of the most suitable analytical, calculation and experimental methods for conducting research, interpretation of research results.
ZN 8	Procedure Setting and formulation and solution of problems in the field of power

	engineering, electrical and electro related to surveillance procedures, facilities, measurement, diagnosis and prediction, given the importance of social constraints (society, health and safety, environment , economy, industry, etc.).
ZN 9	Regulatory and technical documents and standards in power engineering, electrical engineering and electromechanics.
ZN 10	Stages of design and development of engineering products, processes and systems of automated production, selection and application of methods of computerized experimental research.
ZN 11	Ways to build computerized databases, cloud and Internet technologies, scientific databases and other relevant sources of information.
SKILLS	
UM 1	Have modern methods and developed methods of design and research, as well as analysis of the results.
UM 2	Organize and conduct technical tests of engineering products.
UM 3	To assess the impact of electricity, electrical engineering and electromechanics on the environment and human safety.
UM 4	Use Modern and methods of theoretical and experimental studies on evaluation of the accuracy of the measurement results.
UM 5	Apply hardware and software of modern information technologies to solve problems in the field of power engineering, electrical engineering and electromechanics and information and measuring technology.
UM 6	Use the basics of patent science and intellectual property protection.
UM 7	Adhere to the principles of professional ethics and academic integrity.
UM 8	To organize joint work with specialists from different fields in the framework of research projects.
UM 9	Formulate basic psychological and pedagogical principles and be able to teach professionally-oriented disciplines in power engineering, electrical engineering and electromechanics.
UM 10	Analyze the subject area, formalize management tasks and divide the global task into components.
UM 11	Develop a feasibility study for projects in electricity, electrical engineering and electromechanics and assess the economic efficiency of their implementation.
8 - Resource support for program implementation	
Staffing	In accordance with the personnel requirements for ensuring the implementation of educational activities for the relevant level of HE (Annex 2 to the License Conditions), approved by the Resolution of the Cabinet of Ministers of Ukraine dated 30.12.2015 № 1187
Logistics	In accordance with the technological requirements for material -technical support of educational activities of the appropriate level of HE (Annex 4 to the License Conditions), approved by the Resolution of the Cabinet of Ministers of Ukraine dated 30.12.2015 № 1187
Information and educational and methodical support	In accordance with the technological requirements for teaching and information support educational activities of the appropriate level of HE (Annex 5 to the License Conditions), approved by the Resolution of the Cabinet of Ministers of Ukraine dated 30.12.2015 № 1187
9 - Academic mobility	
National credit mobility	Possibility to conclude agreements on academic mobility, double graduation, etc.
International credit mobility	It is possible to conclude agreements on international academic mobility, double graduation, long-term international projects involving postgraduate training, etc.

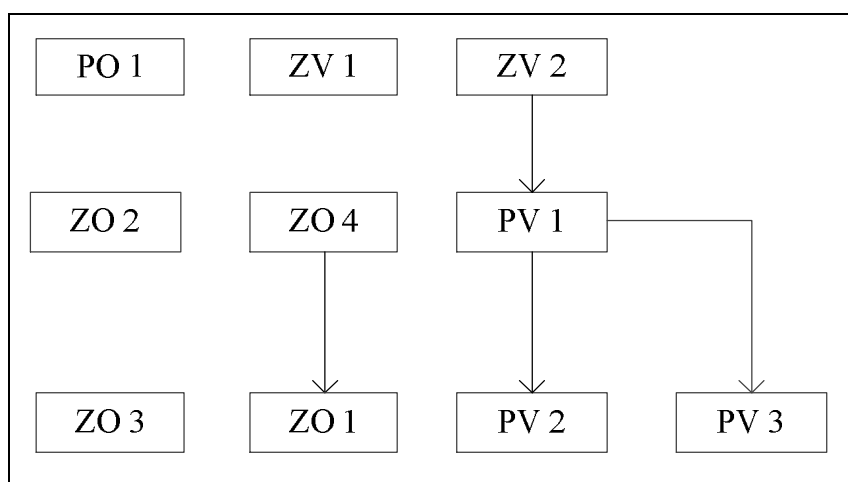
	International projects: The project Erasmus + (KA 1) of est Pomeranian University of Technology in Szczecin, Poland (West Pomeranian University of Technology in Szczecin) DAAD project with Hessen University of Applied Sciences, University of Applied Sciences, Hesse, Germany (Technische Hochschule Mittelhessen - University of Applied Sciences) The project Erasmus + (KA 1) with the University of Lorraine HI th schools and Ming Nancy in Nancy, France (Universite de Lorraine Ecole Nationale Superieur des Mines Nancy , ville Nan cy , France) Erasmus + project (KA 1) with the University of Le Mans, city of Le Mans, France (Universit é du Maine , ville Le Mans , France) Erasmus + project (KA 1) with the University of Applied Sciences in Giessen, Germany (Technische Hochschule Mittelhessen)
Learning foreign applicants	Teaching in English

2. LIST OF COMPONENTS OF THE EDUCATIONAL PROGRAM

Course code	Components of the educational program (academic disciplines, practices, qualification work)	Number of credits	Form of final control
1	2	3	4
1. The cycle of general training			
Mandatory components of the educational program			
ZO 1	Methods of research, formation and management of intelligent energy systems and complexes	3	Examination
ZO 2	Fundamentals of the theory of electromagnetic field and processes	3	Examination
ZO 3	Unconventional and renewable energy sources in power systems and electrical complexes	3	Test
ZO 4	Monitoring, control and protection of electric power systems and electrical complexes	3	Examination
Selective components of the educational program			
ZV 1	General scientific (philosophical) disciplines of the graduate student's choice	4	Examination
ZV 2	Educational discipline of language and practical training	6	Examination
2. Cycle of professional training			
Mandatory components of the educational program			
ON 1	Pedagogical practice	2	Test
Selective components of the educational program			
PV 1	Academic disciplines on advanced technologies in electric drive and electromechanical systems (taught in a foreign language, at the choice of the graduate student)	2	Test
PV 2	Courses on modern methods of synthesis, analysis and research of dynamical systems (at the choice of the graduate student)	2	Test

1	2	3	4
PV 3	Academic disciplines in mathematical modeling of power systems and electrical systems (at the choice of the graduate student)	2	Examination
The total volume of the general training cycle :		22	
The total volume of the cycle of professional training :		8	
The total amount of mandatory components :		14	
The total amount of sample components :		16	
including the choice of graduate students :		Not less than 6 cr.	
TOTAL VOLUME OF THE EDUCATIONAL PROGRAM		30	

3. STRUCTURAL AND LOGICAL SCHEME OF THE EDUCATIONAL PROGRAM



4. FORM OF FINAL CERTIFICATION OF HIGHER EDUCATION APPLICANTS

Graduation certification of applicants for higher education in the educational program "Electrical devices and electrotechnological complexes" specialty 141 - "Electric power engineering, electrical engineering and electromechanics" is in the form of dissertation defense and ends with the issuance of a standard document on awarding the degree of Doctor of Philosophy in Electric Power Engineering, Electrical Engineering and Electromechanics. Graduation certification is open and public.

5. MATRIX OF CORRESPONDENCE OF PROGRAM COMPETENCES TO COMPONENTS OF THE EDUCATIONAL PROGRAM

	ZO 1	ZO 2	ZO 3	ZO 4	ZV 1	ZV 2	ON 1	PV 1	PV 2	PV 3
ZK 1	+							+	+	+
ZK 2	+								+	+
ZK 3	+		+						+	+
ZK 4				+					+	
ZK 5	+				+					
ZK 6					+	+	+			
ZK 7					+	+	+	+		
ZK 8					+	+	+			
ZK 9						+	+	+		
ZK 10	+			+	+	+			+	
ZK 11		+						+	+	
ZK 12						+	+	+		
ZK 13					+	+		+		
FC 1		+			+				+	
FC 2					+				+	+
FC 3		+	+	+						
FC 4		+	+	+		+			+	
FC 5									+	+
FC 6	+									+
FC 7	+								+	+
FC 8	+			+					+	+
FC 9		+			+					
FC 10	+	+	+	+						
FC 11				+					+	
FC 12	+			+	+					
FC 13				+		+		+		
FC 14	+	+	+	+						
FC 15		+	+		+					
FC 16	+								+	
FC 17					+		+			
FC 18					+	+	+			
FC 19					+		+			
FC 20		+			+		+		+	

6. MATRIX OF PROVIDING PROGRAM LEARNING OUTCOMES WITH RELEVANT COMPONENTS OF THE EDUCATIONAL PROGRAM

	ZO 1	ZO 2	ZO 3	ZO 4	ZV 1	ZV 2	ON 1	PV 1	PV 2	PV 3
ZN 1		+			+					
ZN 2					+	+	+			
ZN 3						+			+	
ZN 4	+	+	+	+						
ZN 5	+	+							+	
ZN 6	+	+	+	+	+					
ZN 7	+								+	+
ZN 8					+		+		+	+
ZN 9	+		+	+						
ZN 10								+	+	+
ZN 11	+			+					+	+
UM 1	+	+							+	+
UM 2	+								+	+
UM 3	+	+	+	+						
UM 4	+							+	+	+
UM 5	+									+
UM 6					+				+	
UM 7					+	+	+			
UM 8		+	+		+	+	+	+		
UM 9					+	+	+	+		
UM 10	+	+			+				+	+
UM 11	+	+	+	+						