

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ  
ВІННИЦЬКИЙ НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ



ЗАТВЕРДЖЕНО

Ректор ВНТУ

Віктор БІЛЧЕНКО

Наказ ВНТУ №79 від 30.03.2023

ОСВІТНЬО-ПРОФЕСІЙНА ПРОГРАМА

**Електричні станції**  
**Power plant**

|                      |  |
|----------------------|--|
| Рівень освіти        | другий (магістерський)   |
| Спеціальність        | 141 Електроенергетика, електротехніка та електромеханіка       |
| Галузь знань         | 14 Електрична інженерія  |
| Освітня кваліфікація | магістр з електроенергетики, електротехніки та електромеханіки |

Розглянуто та схвалено  
на засіданні Вченої Ради ВНТУ  
Протокол №9 від 30.03.2023

Вінниця, 2023

## ЛИСТ ПОГОДЖЕННЯ

### ОПП Електричні станції

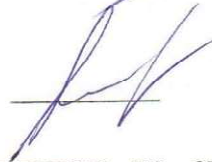
Рівень вищої освіти - другий (магістерський)  
Спеціальність - 141 Електроенергетика, електротехніка та електромеханіка

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Освітньо-професійну програму розглянуто та схвалено на засіданні кафедри Електричних станцій та систем, протокол №9 від 16.01.2023 р.

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Голова



Олександр ПЕТРОВ

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### ОПП Електричні станції

Рівень вищої освіти - другий (магістерський)

Спеціальність - 141 Електроенергетика, електротехніка та електромеханіка

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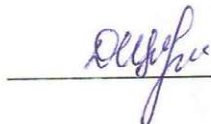
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Освітньо-професійну програму розглянуто та схвалено на засідання Студентської ради факультету електроенергетики та електромеханіки, протокол №6 від 14.03.2023 р.

Голова



Данило ЩЕРБАТИЙ

## **TAKEN INTO ACCOUNT**

*Remarks and proposals of stakeholders based on the discussion results regarding the renewal of educational components:*

- scientific and pedagogical staff of the Electrical Stations and Systems department;*
- students of higher education studying under the educational program "Power Stations";*
- Doctor of Technical Sciences, Professor, Deputy Director for Scientific Work of the Institute of Electrodynamics of the National Academy of Sciences of Ukraine - Ihor Viktorovych Blinov;*
- director of information technology JSC "Vinnytsiaoblenergo", Ph.D. - Tomashevsky Yuriy Vasyliovych.*

## Content

|    |  |    |
|----|--|----|
|    | Introduction   | 5  |
| 1. | Profile of the educational and professional program  | 5  |
| 2. | List of components of the educational and professional program and their logical sequence    | 15 |
| 3. | Structural and logical scheme of the educational and professional program                    | 16 |
| 4. | Forms of attestation of applicants of higher education                                       | 17 |
| 5. | Requirements for the existence of a system of internal quality assurance of higher education | 17 |
| 6. | The list of normative documents on which the standard of higher education is based           | 18 |
|    | An explanatory note  | 18 |
|    | Table 1. Matrix of providing program learning outcomes with mandatory educational components | 19 |
|    | Table 2. Matrix of compliance of competencies with compulsory educational components         | 20 |

## Introduction

The educational and professional program (hereinafter - EPP) of master's training in the specialty 141 "Electrical power engineering, electrical engineering and electromechanics" was developed taking into account the proposals of the Scientific and Methodological Council of the Ministry of Education and Science of Ukraine, the Scientific and Methodical Subcommittee for the specialty 141 "Electrical Power Engineering, Electrical Engineering and Electromechanics".

### 1 Profile of the educational and professional program

| <b>1 – General information</b>  |   |
|---|---|
| <b>Full name of the higher educational institution and structural unit</b>  | Vinnitsya National Technical University, Power Stations and Systems Department  |
| <b>Degree of higher education</b>   | Master's degree   |
| <b>Educational qualification</b>  | Master's degree in electrical engineering, electrical engineering and electromechanics  |
| <b>The official name of the educational program</b>   | Power stations  |
| <b>Diploma qualification</b>  | The degree of higher education is a master's degree<br>Field of knowledge - 14 Electrical engineering<br>Specialty - 141 Power engineering, electrical engineering and electromechanics |
| <b>Type of diploma and scope of the educational program</b>   | Master's degree, single, 90 ECTS credits, term of study<br>- full-time: 1 year 4 months<br>- part-time: 1 year 10 months  |
| <b>Cycle/level</b>  | The 7th level of the NQF of Ukraine, the second cycle of the FQ-EHEA,<br>The 7th level  |
| <b>Prerequisites</b>  | Bachelor's, Master's, Specialist's diploma  |
| <b>Language(s) of instruction</b>   | Ukrainian, English  |
| <b>Accreditation</b>  | Certificate of accreditation of УД specialty 02007655 valid until 01.07.2024  |
| <b>Internet address of the permanent placement of the EPP description</b>   | <a href="http://vntu.edu.ua/uk/information-for-enrollee/progmagbak.html">http://vntu.edu.ua/uk/information-for-enrollee/progmagbak.html</a>   |
| <b>2 – The purpose of the EPP</b>   |   |
| The formation of a creative personality of a new generation, capable of successfully implementing the acquired modern professional competences from power stations, intellectual potential, skills of practical experience and innovative |   |

activities in the field of electric power, electrical engineering and electromechanics, as well as social-patriotic and moral-ethical values in the global socio-economic space.<sup>1</sup>

**3 – Characteristics of the EPP**

|  |   |
|--|---|
| <b>Subject field (field of knowledge, specialty, specialization)</b> | Field of knowledge - 14 «Electrical engineering»<br>Specialty - 141 «Electric power engineering, electrical engineering and electromechanics» |
|--|---|

|   |                              |
|---|------------------------------|
| <b>Orientation of the educational program</b> | Educational and professional |
|---|------------------------------|

|   |  |
|---|--|
| <b>Description of the subject field</b> | <p style="text-align: center;"><b>Objects of study and/or activity</b></p> <ul style="list-style-type: none"> <li>- energy sources, enterprises of the electric power complex, electrotechnical and electromechanical companies, educational institutions, organizations and scientific institutions in the power industry;</li> <li>- processes of production, transmission and consumption of electric energy at power stations, including renewable energy sources;</li> <li>- electrical energy conversion processes; safety analysis, diagnostics, operation of electric power, electrotechnical and electromechanical equipment at electric power generation facilities.</li> </ul> <p style="text-align: center;"><b>Learning objectives</b></p> <ul style="list-style-type: none"> <li>- acquisition by students of higher education of competencies relevant for the modern electric power industry and industry;</li> <li>- training of specialists capable of constructing, designing, operating electricity generation and transmission facilities, performing installation, debugging and repair of electric power equipment, developing new methods and means of optimizing the operating modes of power stations and conducting scientific research.</li> </ul> <p style="text-align: center;"><b>Theoretical content of the subject area</b></p> <p>Basic concepts of the theory of electrical engineering, modeling, analysis and optimization of operating modes of electrical stations in energy systems; electric machines, electrotechnical and electromechanical systems and complexes using traditional and renewable energy sources.</p> <p style="text-align: center;"><b>Methods, techniques and technologies</b></p> <p>Methods, techniques and technologies: methods and means of researching processes in the equipment of power stations and power systems, systems of automated control, relay protection and automation.</p> |
|---|--|

|  |   |
|--|---|
|  | <p style="text-align: center;"><b>Tools and equipment</b></p> <p>Means, devices, systems, technologies of automated design of electrical installations, control, monitoring and restoration of the functionality of electrical equipment.</p>   |
| <p><b>The main focus of the educational program and specialization</b></p> | <p>Acquisition of fundamental and specialized knowledge, including modern scientific achievements in the field of the energy industry, orientation to innovative activities and current directions, within the framework of which a further professional and scientific career is possible.</p> <p>General – design, organization and management activities in the field of operation of electrical equipment of power stations.</p> <p>Special - design, organization and management activities in the field of electrical engineering with the use of Smart Grid technologies.</p> <p>Keywords: electric power industry, electric stations and systems.</p>   |
| <p><b>Features of the program</b></p>                                      | <p>Features of the program The program has been developed taking into account regional features, which includes not only the classic directions of electric power engineering and electrical engineering, but also the issue of intellectualization of electrical systems with a significant share of renewable energy sources. The structure of the educational program is presented in such a way as to prepare specialists capable of designing and operating power generation and transmission facilities, developing new methods and means of optimizing the operating modes of power systems using Smart Grid technologies and renewable sources.</p> <p>The advantages of the educational and professional program are the developed material and technical base and the maintenance of close ties with the real sector of the economy, which is manifested in the participation of stakeholders in the development of work programs, their conducting of classes, and in the involvement of students in internships at employers' sites.</p> <p>Participation in academic mobility programs.</p> <p>Ability to teach subjects in English.</p> <p>Conducting students' practice at the industry's production facilities.</p> |



| <b>4 – Graduates' suitability for employment and further education</b> |  |
|--|--|
| <b>Suitability for employment</b>                                      | <p>According to the DK003:2010 profession classifier, graduates can perform the following types of professional work:</p> <p>2143.2 Emergency automation operation engineer</p> <p>2143.2 Engineer for electrification of an agricultural enterprise</p> <p>2143.2 Engineer of the converting complex 2143.2 Electrical engineer in the power sector 2143.2 Power engineer</p> <p>2143.2 Design engineer (electrical engineering)</p> <p>2144.2 Engineer for high-voltage tests and measurements of power equipment</p> <p>2145.2 Engineer for mechanization and automation of production processes</p> <p>2145.2 Engineer for the mechanization of labor-intensive processes</p> <p>2149.2 Engineer for the design of mechanized developments</p> <p>2149.2 Mining electromechanical engineer</p> <p>2149.2 Design engineer</p> <p>2149.2 Engineer-designer of machines and equipment of agricultural production</p> <p>Professional certification is possible. Graduates' employment rights are not limited.</p> |
| <b>Further education</b>   | <p>Graduates have the right to continue their studies at the third (educational and scientific) level of higher education. Acquisition of additional qualifications in the postgraduate education system.</p>  |
| <b>5 – Teaching and assessment</b>                                     |  |
| <b>Teaching and training</b>   | <p>Lectures, practical classes, performance of coursework, research laboratory work, independent work based on textbooks, study guides and lecture notes, consultations with teachers, scientific seminars, demonstration classes, elements of distance (online, electronic) training, practical training at specialized enterprises and in research institutions, preparation of qualification work.</p>  |
| <b>Assessment</b>  | <p>Assessment methods – exams, tests, practice, tests, term papers, essays, presentations.</p> <p>Formative (input testing and ongoing control): testing of knowledge or skills; oral presentations; reports on laboratory work; analysis of texts or data; practice reports; literature review, etc.).</p> <p>Summative (final control); settlement (according to</p>   |

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|  | the results of regulatory control).  |
| <b>6 – Program competences</b>                 |  |
| <b>Integral competence</b>                     | IC01. The ability to solve complex problems and tasks during professional activity in the field of electric power, electrical engineering and electromechanics or during the learning process, which involves conducting research and/or implementing innovations and is characterized by the uncertainty of conditions and requirements.  |
| <b>General competences (GC)</b>                | GC01. Ability to abstract thinking, analysis and synthesis, personal and professional development.<br>GC02. Ability to search, process and analyze information from various sources, as well as possess critical thinking skills.<br>GC03. Ability to use information and communication technologies.<br>GC04. Ability to apply knowledge in practical situations and continue learning with a high degree of autonomy.<br>GC05. The ability to use a foreign language to carry out scientific and technical activities.<br>GC06. Ability to make informed decisions, apply best practices in professional activities.<br>GC07. Ability to learn and master current knowledge, be responsible for contributing to professional knowledge and practice and/or evaluating the results of teams and collectives.<br>GC08. Ability to identify and assess risks.<br>GC09. Ability to work independently and in a team, motivate people and move towards a common goal.<br>GC10. The ability to detect feedback and adjust your actions taking it into account. |
| <b>Special (professional) competences (SC)</b> | SC01. The ability to apply specialized conceptual knowledge, including modern scientific achievements in the field of electric power and electrical engineering to solve scientific and technical problems and tasks.<br>SC02. The ability to apply existing and develop new methods, techniques, technologies and procedures for solving engineering tasks of electric power and electrical engineering.<br>SC03. The ability to plan, organize and conduct scientific research, as well as clear and unambiguous communication of own knowledge, conclusions and arguments to specialists and non-specialists in the   |

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|  | <p>field of electric power and electrical engineering, in particular to students.</p> <p>SC04. The ability to develop and implement measures to increase reliability, efficiency and safety in the design and operation of equipment and facilities of the electric power industry.</p> <p>SC05. Ability to carry out analysis of technical and economic indicators and examination of design and construction solutions in the field of electric power and electrical engineering.</p> <p>SC06. Ability to demonstrate knowledge and understanding of mathematical principles and methods required for use in electrical power, electrical engineering, and electromechanics.</p> <p>SC07. Ability to demonstrate awareness of intellectual property issues, management of work or learning processes that are complex, unpredictable and require new strategic approaches in electric power.</p> <p>SC08. The ability to solve problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility related to issues of nature conservation, sustainable development, health and safety and risk assessments in electricity.</p> <p>SC09. The ability to understand and take into account social, environmental, ethical, economic and commercial considerations affecting the implementation of technical solutions in electric power, electrical engineering and electromechanics.</p> <p>SC10. Ability to apply specialized skills/problem-solving skills necessary for conducting research and/or implementing innovative activities to develop new knowledge and project management procedures and evaluate their results.</p> <p>SC11. The ability to evaluate indicators of reliability and efficiency of the functioning of electric power systems, electrotechnical and electromechanical objects.</p> <p>SC12. The ability to develop plans and projects to ensure the achievement of a specific goal, taking into account all aspects of the problem being solved, including the production, operation, maintenance and disposal of power system equipment.</p> |
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|  | <p>SC13. Ability to demonstrate awareness and ability to use regulatory and legal acts, norms, rules and standards in electric power.</p> <p>SC14. Ability to use software for computer modeling, automated design, automated manufacturing, and automated development or construction of power system elements.</p> <p>SC15. The ability to publish the results of their research in specialized scientific publications.</p> <p>SC16. The ability to solve complex specialized tasks and practical problems related to the operation of information systems in electric power engineering, electrical engineering and electromechanics.</p> <p>SC17. The ability to solve complex specialized tasks and practical problems related to the optimal development of electrical energy transmission and distribution systems.</p> <p>SC18. The ability to solve complex specialized tasks and practical problems related to dispatching and optimal management of systems of production, transmission and distribution of electric energy.</p>   |
| <b>7 – Training programmatic results</b> |  |
|  | <p>TR1. Find options for increasing the energy efficiency and reliability of energy, electrotechnical and electromechanical equipment and corresponding complexes and systems.</p> <p>TR2. Reproduce processes in electrical, electrotechnical and electromechanical systems when simulating them on a personal computer.</p> <p>TR3. Master new versions or new software designed for computer modeling of objects and processes in energy, electrical and electromechanical systems.</p> <p>TR4. Outline a plan of measures to increase the reliability, safety of operation and extend the resource of power, electrical and electromechanical equipment and relevant complexes and systems.</p> <p>TR5. Analyze processes in electric power, electrotechnical and electromechanical equipment and corresponding complexes and systems.</p> <p>TR6. Reconstruct existing electrical networks, stations and substations, electrotechnical and electromechanical complexes and systems in order to increase their reliability, efficiency of operation and extension of the resource.</p> <p>TR7. To have the methods of mathematical and</p> |

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|  | <p>physical modeling of objects and processes in electric power, electrotechnical and electromechanical systems.</p> <p>TR8. Estimate the total costs of scientific research and development.</p> <p>TR9. Protect your own intellectual property rights and respect the similar rights of others.</p> <p>TR10. Search for educational programs, grants and scholarships of the European Union and other countries.</p> <p>TR11. Find investments in scientific research and innovation.</p> <p>TR12. To participate in international scientific conferences and seminars devoted to modern problems in the field of electric power engineering, electrical engineering and electromechanics.</p> <p>TR13. Choose the direction of scientific research taking into account modern problems in the field of power engineering, electrical engineering and electromechanics.</p> <p>TR14. Follow the principle of lifelong learning.</p> <p>TR15. Cooperate with foreign scientists and specialists in the field of electric power engineering, electrical engineering and electromechanics.</p> <p>TR16. Adhere to the principles of democracy and respect for the rights of citizens.</p> <p>TR17. To adhere to the principles and directions of the energy security development strategy of Ukraine.</p> <p>TR18. To combine various forms of research work and practical activities in order to overcome the gap between theory and practice, scientific achievements and their practical implementation.</p> <p>TR19. To demonstrate respect for the identity of representatives of different cultures and faiths.</p> <p>TR20. Adhere to the principles and rules of academic honesty in educational and scientific activities.</p> <p>TR21. Follow the rules for writing scientific articles and theses of reports.</p> <p>TR22. Demonstrate understanding of regulations, norms, rules and standards in the field of electricity, electrical engineering and electromechanics.</p> <p>TR23. To carry out scientific research in the field of use and conservation of electrical energy.</p> <p>TR24. To improve spoken and written foreign</p> |
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|   | <p>language skills while participating in international scientific conferences and seminars devoted to modern problems in the field of electric power, electrical engineering and electromechanics.</p> <p>TR25. Develop a plan, stages and terms of work on an innovative project in the field of electric power, electrical engineering and electromechanics.</p> <p>TR26. Identify problems and identify limitations related to issues of environmental protection, sustainable development, human health and safety, and risk assessments in the field of electric power, electrical engineering, and electromechanics.</p> <p>TR27. Identify the main factors and technical problems that may hinder the implementation of modern methods of controlling electric power, electrotechnical and electromechanical systems.</p> |
| <b>8 – Resource support for program implementation</b>          |   |
| <b>Human resources</b>  | <p>Personnel support of the OPP is formed, mainly, at the expense of the department of electrical plants and systems. Other departments of the Faculty of Power Engineering and Electromechanics and the university are also involved in the teaching of disciplines.</p> <p>The guarantor of the educational program and the teaching staff, which ensures its implementation, meet the requirements specified in the Licensing conditions for conducting educational activities.</p>  |
| <b>Material and technical support</b>                           | <p>Material and technical support meets the requirements of the Licensing conditions for the implementation of educational activities, including laboratories aimed at acquiring special (professional) competencies, mastering practical skills in the field of electricity.</p>   |
| <b>Informational and educational and methodological support</b> | <p>It includes library resources, electronic educational resources, JetIQ, the website of VNTU and the website of the department, which contain basic information about educational activities under the EPP.</p>   |
| <b>9 – Academic mobility</b>                                    |   |
| <b>National credit mobility</b>                                 | <p>The possibility of studying within the framework of agreements on national credit mobility and obtaining a double diploma.</p>   |
| <b>International credit mobility</b>                            | <p>It is carried out on the basis of the conclusion of agreements between the University and a group of higher education institutions of different countries</p>  |

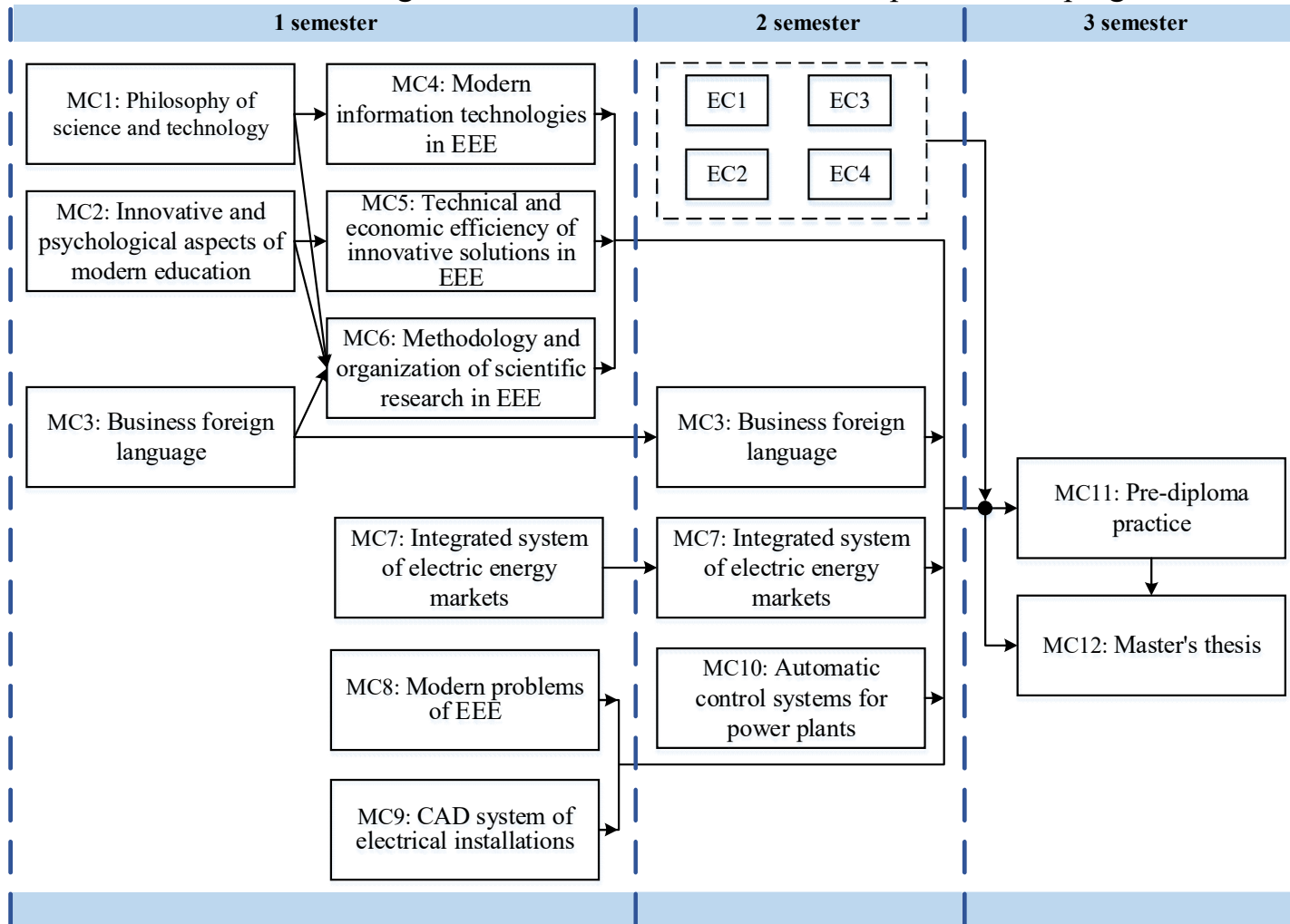
|                                      |   |
|--------------------------------------|---|
|                                      | according to the agreed and approved in accordance with the established procedure individual study plans of students and programs of academic disciplines, as well as within the framework of intergovernmental agreements on cooperation in the field of education, international projects in which the University participates , grants, etc. |
| <b>Education of foreign students</b> | According to this educational program, the training of foreign students is provided.  |

## **2 List of components of the educational and professional program and their logical sequence**

### 2.1 List of components of the educational and professional program

| Code  | Components of the educational program (study subjects, course projects (works), practices, qualification work) | Number of credits | Final control form |
|---|--|-------------------|--------------------|
| <b>MANDATORY COMPONENTS</b>                             |  |                   |                    |
| General   |  |                   |                    |
| 1.1   | Philosophy of science and technology   | 3,0               | test               |
| 1.2   | Innovative and psychological aspects of modern education   | 3,0               | test               |
| 1.3   | Business foreign language (Ukrainian as a foreign language for foreign students)                               | 3,0               | test               |
| Professional  |  |                   |                    |
| 1.4   | Modern information technologies in EEE   | 3,0               | exam               |
| 1.5   | Technical and economic efficiency of innovative solutions in EEE   | 4,5               | diff. test         |
| 1.6   | Methodology and organization of scientific research in EEE   | 4,0               | exam               |
| 1.7   | Integrated system of electric energy markets   | 3,0               | diff. test         |
| 1.8   | Modern problems of EEE   | 4,5               | exam               |
| 1.9   | CAD system of electrical installations (including a course project)  | 5,0               | exam               |
| 1.10  | Automatic control systems for power plants (including a course project)  | 4,0               | exam               |
| 1.11  | Pre-diploma practice   | 10,0              | diff. test         |
| 1.12  | Master's thesis  | 20,0              |                    |
| <b>Total amount of mandatory components</b>             |  | <b>67</b>         |                    |
| <b>ELECTIVE COMPONENTS OF THE STUDENT'S FREE CHOICE</b> |  |                   |                    |
| 2.1   | Educational component 1  | 5,0               | diff. test         |
| 2.2   | Educational component 2  | 6,0               | diff. test         |
| 2.3   | Educational component 3  | 6,0               | diff. test         |
| 2.4   | Educational component 4  | 6,0               | diff. test         |
| The total amount of elective components                 |  | <b>23</b>         |                    |
| <b>TOTAL VOLUME ACCORDING TO THE PLAN</b>               |  | <b>90</b>         |                    |

### 3. Structural and logical scheme of the educational and professional program





## **4. Forms of attestation of higher education applicants**

### **Forms of attestation of higher education applicants**

Attestation of students of higher education in the educational program "Power Stations" specialty 141 "Electric Power Engineering, Electrical Engineering and Electromechanics" is carried out in the form of public defense of the qualification project (qualification work).

### **Requirements for qualifying work**

The qualification project (qualification work) involves the solution of a complex specialized task or a practical problem of electric power and electrical engineering, characterized by the complexity and uncertainty of conditions, with the application of theories and methods of electrical engineering.

The qualification project (qualification work) must not contain academic plagiarism, fabrication and falsification.

After the defense, the qualification project (qualification work) is placed in the university repository for free access.

## **5. Requirements for the presence of an internal support system quality of higher education**

The VNTU operates a system for ensuring the quality of educational activities and the quality of higher education (internal quality assurance system), which provides for the implementation of the following procedures and measures:

- 1) determination of the principles and procedures for ensuring the quality of higher education;
- 2) monitoring and periodic review of educational programs;
- 3) annual assessment of higher education applicants, scientific-pedagogical and pedagogical staff of the institution of higher education and regular publication of the results of such assessments on the official website of VNTU, on information stands and in any other way;
- 4) provision of advanced training of pedagogical, scientific and scientific-pedagogical workers;
- 5) ensuring the availability of the necessary resources for the organization of the educational process, including the independent work of students, for each educational program;
- 6) ensuring the availability of information systems for effective management of the educational process;
- 7) ensuring publicity of information about educational programs, degrees of higher education and qualifications;
- 8) ensuring compliance with academic integrity by employees and students of higher education, including the creation and ensuring the functioning of an effective system for the prevention and detection of academic plagiarism;
- 9) other procedures and measures.

The system of ensuring the quality of educational activities and the quality of higher education (the system of internal quality assurance) is evaluated by the National Agency for Quality Assurance of Higher Education or independent institutions accredited by it for the purpose of its compliance with the requirements for the system of quality assurance of higher education, approved by the National Agency for Quality Assurance of Higher Education, and international standards and recommendations for quality assurance of higher education.

## **6. List of normative documents on which it is based educational program**

- Law of Ukraine dated July 1, 2014 No. 1556-VII "On Higher Education" [Access mode: <http://zakon4.rada.gov.ua/laws/show/1556-18>];
- Decree of the Cabinet of Ministers of Ukraine dated April 29, 2015 No. 266 "On approval of the list of fields of knowledge and specialties for which higher education applicants are trained" [Access mode: <http://zakon4.rada.gov.ua/laws/show/266-2015-p>];
- Decree of the Cabinet of Ministers of Ukraine No. 1187 of 12/30/2015 "On approval of the Licensing conditions for conducting educational activities of educational institutions" [Access mode: <http://zakon4.rada.gov.ua/laws/show/1187-2015-п/page>];
- Decree of the Cabinet of Ministers of Ukraine dated November 23, 2011 No. 1341 "On approval of the National Framework of Qualifications" [Access mode: <http://zakon4.rada.gov.ua/laws/show/1341-2011-p>];
- National Classifier of Ukraine: "Classification of types of economic activity" DK 009: 2010 [Access mode: <http://www.ukrstat.gov.ua/>];
- National Classifier of Ukraine: "Profession Classifier" DK 003: 2010DK 003:2010 [Access mode: <http://www.dk003.com/>].

### **Explanatory note**

The educational and professional program contains program competencies that determine the specifics of master's training in the specialty 141 "Electric power, electrical engineering and electromechanics" under the educational program "Electrical stations" and program learning outcomes that express what a student should know, understand and be able to perform after successful completion of the educational program.

Tables 1 and 2 show correspondence matrices of learning outcomes (competencies) and educational components defined by the educational program.

Elective components are chosen by students independently from the bank of subjects of free choice, which is approved by the Academic Council of VNTU every academic year in accordance with the Regulation on the free choice of subjects of study by students of higher education of the Vinnytsia National Technical University.

**Table 1. Matrix of provision of program learning outcomes with mandatory educational components**

|      | MC1 | MC2 | MC3 | MC4 | MC5 | MC6 | MC7 | MC8 | MC9 | MC10 | MC11 | MC12 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| TR1  |     |     |     | +   | +   |     |     |     | +   | +    | +    | +    |
| TR2  |     |     |     | +   |     | +   |     |     | +   | +    |      | +    |
| TR3  |     |     |     | +   |     | +   |     |     | +   | +    |      | +    |
| TR4  |     |     |     |     |     |     |     | +   |     |      |      | +    |
| TR5  |     |     |     |     |     | +   | +   | +   | +   | +    | +    | +    |
| TR6  |     |     |     | +   |     |     |     | +   | +   |      |      | +    |
| TR7  |     |     |     |     |     | +   |     |     | +   | +    |      | +    |
| TR8  |     |     |     |     | +   | +   |     |     |     |      |      | +    |
| TR9  |     | +   |     |     |     |     |     |     |     |      |      | +    |
| TR10 |     | +   |     |     | +   | +   |     |     |     |      |      |      |
| TR11 |     |     |     |     |     | +   |     |     |     |      |      | +    |
| TR12 |     | +   |     | +   |     | +   |     | +   |     |      | +    |      |
| TR13 |     |     |     |     |     | +   |     | +   |     |      |      | +    |
| TR14 |     |     |     |     |     |     |     |     |     |      | +    | +    |
| TR15 |     |     |     |     |     | +   |     |     |     |      | +    | +    |
| TR16 |     | +   |     |     |     |     |     |     |     |      | +    |      |
| TR17 |     |     |     | +   |     |     |     | +   |     |      | +    | +    |
| TR18 |     |     |     |     |     | +   |     | +   | +   |      | +    | +    |
| TR19 | +   | +   | +   |     |     |     |     |     |     |      | +    |      |
| TR20 |     |     |     |     | +   |     |     |     |     |      | +    | +    |
| TR21 |     |     |     |     |     | +   |     |     |     |      |      | +    |
| TR22 |     |     |     |     | +   | +   | +   |     | +   |      |      | +    |
| TR23 |     |     |     |     |     |     | +   |     |     |      |      | +    |
| TR24 |     |     | +   |     |     | +   |     |     |     |      | +    | +    |
| TR25 |     |     |     |     | +   |     |     |     |     |      |      | +    |
| TR26 |     |     |     |     |     |     |     |     |     |      | +    | +    |
| TR27 |     |     |     |     |     |     | +   |     |     | +    |      | +    |

**Table 2. Matrix of compliance of competencies with mandatory educational components**

|       | MC1 | MC2 | MC3 | MC4 | MC5 | MC6 | MC7 | MC8 | MC9 | MC10 | MC11 | MC12 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| GC01  | +   | +   |     |     |     | +   |     |     |     |      |      | +    |
| GC02  | +   |     | +   |     |     | +   | +   |     |     |      |      | +    |
| GC 03 |     |     |     | +   |     |     | +   | +   |     | +    |      | +    |
| GC04  |     |     | +   |     |     |     | +   |     |     |      | +    |      |
| GC05  |     |     | +   |     |     | +   |     |     |     |      | +    |      |
| GC06  |     | +   |     |     | +   |     | +   |     | +   | +    | +    | +    |
| GC07  |     | +   | +   | +   |     |     |     |     |     |      |      | +    |
| GC08  |     |     |     |     | +   |     | +   |     |     | +    | +    | +    |
| GC09  |     | +   |     |     |     |     |     |     |     |      | +    |      |
| GC10  |     |     |     |     |     |     | +   |     |     |      |      | +    |
| SC01  |     |     |     |     |     | +   |     |     |     |      |      | +    |
| SC02  |     |     |     |     |     | +   |     |     | +   | +    |      | +    |
| SC03  | +   |     |     |     |     | +   |     |     |     |      | +    | +    |
| SC04  |     |     |     |     |     |     |     |     | +   | +    |      | +    |
| SC05  |     |     |     |     | +   |     |     |     | +   | +    |      | +    |
| SC06  |     |     |     |     | +   |     | +   |     | +   | +    |      | +    |
| SC07  |     |     |     | +   |     | +   | +   |     |     |      |      | +    |
| SC08  | +   |     |     | +   |     |     | +   |     |     |      |      | +    |
| SC09  | +   | +   |     |     | +   |     |     |     |     |      |      | +    |
| SC10  |     |     |     |     | +   |     |     |     |     |      |      | +    |
| SC11  |     |     |     |     | +   |     |     | +   | +   | +    |      | +    |
| SC12  |     |     |     |     | +   | +   |     |     |     |      | +    | +    |
| SC13  |     |     | +   | +   |     |     |     |     | +   | +    | +    | +    |
| SC14  |     |     |     | +   | +   |     |     |     | +   | +    |      | +    |
| SC15  |     |     | +   |     |     | +   |     | +   |     |      | +    | +    |
| SC16  |     |     |     | +   |     | +   |     | +   |     | +    | +    | +    |
| SC17  |     |     |     |     |     |     |     | +   |     |      | +    | +    |
| SC18  |     |     |     |     | +   |     |     |     |     |      | +    | +    |

## CHANGE REGISTRATION LIST

| Change number | Implementation   | What changed  | When they come into force |
|---------------|--|---|---------------------------|
| 1             | Decision of the Academic Council of VNTU (protocol # 1 dated 30.08.23)<br>Order # 221 dated 30.08.23 | Changing the purpose of EPP in compliance with the new strategy development of VNTU for 2023-2027 (Protocol of the Scientist Council of VNTU # 15 dated June 29 2023) | from 2023/2024 ed.<br>y.  |