

**MINISTRY OF SCIENCE AND HIGHER EDUCATION OF
THE RUSSIAN FEDERATION**

FEDERAL STATE BUDGETARY EDUCATIONAL INSTITUTION OF HIGHER
EDUCATION
"NOVOSIBIRSK STATE TECHNICAL UNIVERSITY"

**GENERAL CHARACTERISTICS OF
THE MAJOR PROFESSIONAL ACADEMIC PROGRAM
OF HIGHER EDUCATION**

Training area: 13.04.02 Electric Power and Electrical Engineering

Specialization: Relay Protection and Automation of Electric Power Systems

Qualification: Master

Full-time form of education

Beginning year of the training program: 2021

The academic program was approved by the Academic Council of the Faculty of Power Engineering, protocol No. 7 dated 08/31/2020.

“APPROVED”

First Vice-Rector

_____ V.V. Yanpolsky

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CONTENT

1. General provisions	2
2. Characteristics of graduates professional activity	4
3. The requirements for program mastering	6
4. The structure and content of the academic program	7
5. Conditions for the implementation of the academic program	8
6. Peculiarities of organizing educational activities for disabled people	8

1. GENERAL PROVISIONS

1.1 Regulatory documents

The major professional academic master program (a master program) for 13.04.02 Electric Power and Electrical Engineering training area and with specialization on: Relay Protection and Automation of Electric Power Systems is developed in accordance with the following documents:

- The Federal State Educational Standard of Higher Education for 13.04.02 Electric Power and Electrical Engineering training area that is approved by the Order of the Ministry of Education and Science of the Russian Federation No. 147 dated 28.02.2018 (registered by the Ministry of Justice of the Russian Federation on 22.03.2018, registration number 50476).

- Professional Standard for:

16.144 Specialist in the maintenance of diesel power plants and uninterruptible power supplies in municipal electrical networks, approved by order of the Ministry of Labor and Social Protection of the Russian Federation dated January 29, 2019 No. 47n, registered with the Ministry of Justice of the Russian Federation on February 25, 2019, registration No. 53883.

16.147 Specialist in the design of power supply systems for capital construction projects, approved by order of the Ministry of Labor and Social Protection of the Russian Federation dated June 4, 2018 No. 352n (as amended on January 20, 2019 by order of the Ministry of Labor of Russia dated December 14, 2018 No. 807n.), registered with the Ministry of Justice of the Russian Federation on June 29, 2018, registration No. 51489.

1.2 The purpose (mission) of the academic program

The mission of 13.04.02 Electric Power and Electrical Engineering academic program with a focus on Relay Protection and Automation of Electric Power Systems includes the following: Relay protection and automation of electric power systems consists in the preparation of masters who are able to carry out professional design activities in the field of technical means, methods and methods of human activity for production, transmission, distribution, transformation, the use of electrical energy, the management of energy flows, the development and manufacture of elements, devices and systems that implement these processes in the field of energy supply of a person, their production activities in the modern world, with maximum energy efficiency, reliability, minimization of man-made impact on the natural environment, with the preservation of life and health human due to the use of modern technical means, control and forecasting methods in the framework of the transition to the digital economy.

1.3 The language of the academic program

The Master's degree program is implemented in the state language of the Russian Federation.

1.4 The terms of mastering the academic program

The master's program includes 120 credits regardless of the applied educational technologies, the implementation of the master's program using a network form, the

implementation of the master's program according to an individual curriculum, (with the exception of accelerated training).

Obtaining education in accordance with the full-time program, regardless of the educational technologies, lasts 2 years including the vacations after passing the state final certification.

The master's program implemented during one academic year includes no more than 70 credits.

1.5 E-learning and distance learning technologies

When implementing the academic program, e-learning and distance learning technologies are used via the electronic informational and educational environment of the Novosibirsk State Technical University (hereinafter - NSTU).

1.6 Network form of the academic program

The academic program is carried out by the organization independently.

1.7 Documents regulating the content and organization of the educational process

The major professional academic program represents a set of major educational characteristics (the scope, the content, the planned results), organizational and pedagogical conditions, forms of certification, which is presented in the following documents:

- general characteristics of the major professional academic program of higher education;
- curriculum;
- calendar training schedule;
- disciplines (modules) work program;
- practice work program;
- assessment materials in the form of assessment funds for disciplines and practice;
- programs and evaluation materials in the form of evaluation funds of the state final certification;
- teaching materials.

Information about the academic program is available on NSTU official website at <http://www.nstu.ru/sveden/education>.

The set of documents for the academic program is updated annually, taking into account the development of science, culture, economy, technology, and the social area.

1.8 Distinctive features of the academic program

Relay Protection and Automation of Electric Power Systems academic program for 13.04.02 Electric Power and Electrical Engineering training area has the following distinctive features:

- it takes the regional characteristics of graduates professional activity and employers needs into account;
- it is professionally orientated towards the field of electric power in the field of design and operation of facilities in which graduates will be able to carry out their professional activities in the future, plan and perform physical or mathematical experiments, work with electromechanical and static protection relays, as well as with microprocessor devices of modern manufacturers, with specialized equipment to test relay protection and automation equipment (RPA), interpret and present the results of scientific research in the form of articles or patents.
- it combines problem types, the development and analysis of generalized options for solving the problem and the implementation of the project; it will allow graduates to get a comprehensive understanding of the processes in the power system that underlie the choice of parameters for the operation of relay protection devices, programming the logic of work, data processing and calculating the settings of modern relay protection and automation facilities for power plants and networks, work with regulatory documents, assess the reliability of relay

protection devices, formulate technical specifications and use automation tools in the design of objects of professional activity, choose serial or design new objects;

- it possesses a set of objects of the professional activity *relay protection and automation of electric power systems and electric networks*, making it possible to work in the leading generating, transmission power grid, installation and commissioning, operational dispatching, sales and design energy organizations in Russia, as well as in the countries of near and far abroad.

1.9. Demand for graduates

Graduates of the academic program are in demand at enterprises and organizations of PJSC RusHydro, LLC Siberian Generating Company, a branch of JSC STC FGC UES - SibNII, faculties of the Novosibirsk State Technical University, Tajik Technical University, JSC System Operator of UES of Russia and its branches, JSC Regional Electric Networks, JSC Institute for Automation of Energy Systems, Novosibirsk branch of FGOU DPO Petersburg Power Engineering Institute, NPP Microprocessor Technologies LLC, RusHydro PJSC, Bolid LLC, ESTRA Group of Companies, Project Center of Siberia ", LLC "NSK-Project ", design organizations and other enterprises, with most of which contracts for the training of specialists have been concluded, and other industrial enterprises in Novosibirsk and the Novosibirsk region.

2. CHARACTERISTICS OF GRADUATES PROFESSIONAL ACTIVITY

2.1 The areas, field, types of tasks, tasks and objects of graduates professional activity

Table 2.1.1 represents the areas, field and professional activity types specified for Relay Protection and Automation of Electric Power Systems academic program for 13.04.02 Electric Power and Electrical Engineering.

Table 2.1.1

Professional activity area(s) (according to the Register of professional activity areas and types)	Professional activity field	Professional activity types of tasks	Professional activity tasks	Professional activity object(s) (branch(es) of knowledge)
16	in the field of design and operation of electric power facilities	Design	Development and analysis of generalized options for solving the problem	Electric networks
				Relay protection and automation of electrical power systems
			Project implementation	Relay protection and automation of electric power systems
				Electricity of the net

2.2. The list of professional standards

The list of professional standards correlates with the major professional academic program in accordance with the register of professional standards (list of professional activity types). The register is published in the Professional Standards section on the Ministry of Labor

and Social Protection of the Russian Federation website (<http://profstandart.rosmintrud.ru>). The list of professional standards corresponds to the field(s) of graduates' professional activity.

Table 2.2.1

Professional standard code and name	generalized job function			job function		
	code	name	qualification level	name	code	qualification level (sublevel)
16.144 Specialist in maintenance of diesel power plants and uninterruptible power supply sources in municipal electrical networks	C	Organization of safe work, repair and reconstruction of diesel power plants and uninterruptible power supply sources	7	Monitoring the operation of electrical equipment of diesel power plants and uninterruptible power supply sources	C/01.7	7
				Control over ensuring uninterrupted and trouble-free operation of electrical equipment of diesel power plants and uninterruptible power supply sources	C/04.7	7
				Monitoring compliance with the requirements of regulatory and technical documentation, job descriptions for the maintenance and repair of electrical equipment of diesel power plants and uninterruptible power supplies	C/05.7	7
16.147 Specialist in the design of	C	Development of a concept for a power	7	Development of a project for a power supply	C/01.7	7

power supply systems for capital construction facilities		supply system for a capital construction facility		system for capital construction facilities		
				Development of design and working documentation for a project of a power supply system for capital construction facilities	C/02.7	7

Table 2.2.1 represents the possible names of positions and professions according to professional standards). These generalized job functions are distinguished to form professional competencies at NSTU:

1.16.144 Specialist in maintenance of diesel power plants and uninterruptible power supplies in municipal electrical networks:

- Head of the operational (repair and maintenance) division (service);
- Chief engineer of the operational (repair and maintenance) division (service);
- Head of the (emergency and recovery) service;
- Head of the Electrical Equipment Operation Department;
- Chief Power Engineer.

2.1477 Specialist in the design of power supply systems for capital construction projects:

- Head of the design department;
- Team leader.

3. THE REQUIREMENTS FOR PROGRAM MASTERING

3.1 Assessment of competencies formation includes the following:

- current monitoring of progress;
- intermediate students certification;
- state final certification of graduates.

Current control and intermediate certification in disciplines and practice is carried out on the basis of a point-rating system. The forms of intermediate students certification are determined by the curriculum for every discipline. The certification rules are determined by the work programs and are explained to the students during the first month of studying the discipline.

The assessment materials include standard tasks, control papers, tests and other control methods that allow assessing the acquired competencies formation. Students are certified for the compliance of their personal achievements with the requirements for academic program mastering. Evaluation materials are developed and approved by the departments that provide the educational process with the academic program.

3.2. The set of the planned learning outcomes in disciplines (modules) and practices ensures the formation of all the competencies during the master's program.

State final certification includes the preparation for the defense and defense of the final qualifying work.

Requirements for the content, scope and structure of the final qualifying work as well as the state exam are determined by the state final certification program.

4. THE STRUCTURE AND CONTENT OF THE ACADEMIC PROGRAM

4.1. The Structure of the academic program

The structure of the academic program includes the mandatory part and the part which is formed by the participants of educational process.

Table 4.1.1

The structure of academic program		Program scope, credits
Section 1	Disciplines (modules)	60
Section 2	Practices	54
Section 3	State final certification	6
The scope of academic program		120

4.2. Mandatory part of the Master's program

The scope of the mandatory part accounts for at least 10% of the total program scope without including the scope of the state final certification.

4.3. Contact work

Educational activities in accordance with the program are carried out in the form of contact work of students with the teaching staff.

The minimum amount of contact work during training period is established by NSTU local act.

4.4. Elective subjects and additional courses

Students are provided with the opportunity to study elective subjects (modules) and additional courses in accordance with NSTU local regulatory act.

Elective subjects (modules) chosen by students are mandatory for studying.

The additional courses chosen by the students are mandatory for studying.

4.5. Characteristics of disciplines content

The content of the disciplines (modules) and practice provided by the curriculum is determined by the requirements for academic program mastering.

4.6. Applied educational technologies

Lectures, practical and laboratory classes are carried out to form the universal, general professional and professional competencies stated by the major academic program.

When organizing the educational process, active and interactive classes are used.

Specific types of educational technologies are defined in the work programs of the disciplines.

The curriculum provides the independent students work which is ensured with the necessary teaching materials available in NSTU electronic information and educational environment.

4.7. Practical training of students

Students practical training is organized by:

- practical classes, workshops, laboratory classes which ensure students participation in individual elements of work related to their future professional activities. These disciplines form general professional and professional competencies of students;

– practical classes according to the curriculum of Relay Protection and Automation of Electric Power Systems academic program for 13.04.02 Electric Power and Electrical Engineering training area.

4.8. Practice organization

To achieve the planned results of mastering the academic program, the following types of practices are stated:

- Educational: Educational practice: practice for obtaining primary skills of research work,
- Educational: Educational practice: practice for obtaining primary skills of working with software used in the area of professional activity,
- Practical: Practical placement: research work,
- Practical: Practical placement: pre-diploma work,
- Practical: Practical placement: project activities.

5. CONDITIONS FOR THE IMPLEMENTATION OF THE ACADEMIC PROGRAM

The conditions for the implementation of the academic program meet the requirements of the Federal State Educational Standard of Higher Education for 13.04.02 Electric Power and Electrical Engineering training area.

The average annual number of NSTU teaching staff publications equals 2 in Web of Science or Scopus journals and 20 in Russian Science Citation Index journals during the master's program per 100 scientific and pedagogical employees.

6. PECULIARITIES OF ORGANIZING EDUCATIONAL ACTIVITIES FOR DISABLED PEOPLE

If there are disabled people among the students, the academic program is adapted according to the special educational needs of such students.

The period of studying in accordance with an individual curriculum for disabled people may be extended at their request by no more than six months compared to the period of the corresponding form of education.

The master's program scope in the individual curriculum for disabled people, regardless of the form of study, cannot exceed 70 credits during one academic year.

At the request, NSTU provides disabled people the opportunity to undergo a master's program according to the peculiarities of their psychophysical development and individual capabilities. The developmental disorders correction and social adaptation are provided if necessary.

The individual program to support the students educational activities is made up in cases of inclusive education.