

**THE MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN
FEDERATION
FEDERAL STATE AUTONOMOUS EDUCATIONAL
INSTITUTION OF HIGHER EDUCATION
NATIONAL RESEARCH NUCLEAR UNIVERSITY MEPhi**

CLAIM

First vice-rector NRNU MEPhi

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“ ” _____ 2018 г.

**COMPETENCE MODEL OF GRADUATE
COMPLETED TRAINING IN THE MASTER'S DEGREE PROGRAM**

**direction of training
14.04.02 NUCLEAR PHYSICS and technology**

**Master program:
Materials for Nuclear Application**

Moscow
2018

1. The GENERAL PROVISIONS

1.1. The Competence model complies with the requirements of the OS in the NRNU MEPHI in 14.04.02 "Nuclear physics and technology".

1.2. The main users of the competency models are:

1.2.1 Combining professionals and employers in the sphere of professional activity.

1.2.2 faculty teaching teams of higher educational institutions responsible for high quality development, effective implementation and updating of the basic education programmes, taking into account the achievements of science, technology and the social sphere in this training.

1.2.3 students were acquiring educational program of the University aimed at shaping skills.

1.2.4 Vice-rectors, responsible within its competence for the quality of graduates.

1.3. the Competence model is the basis for designing the contents of the master program "Nuclear Engineering".

2 GLOSSARY

In this document, the terms and definitions are used in accordance with the Law "on education", federal law "on higher and postgraduate vocational education", as well as with the international instruments in the field of higher education:

type of professional activity -methods, techniques, the nature of the impact on the object of professional activity to his change, transformation;

the competence of the -ability to apply knowledge, skills and personal qualities for successful activity in a certain area;

direction of preparation- the totality of educational programmes at various levels in the same occupational field;

the object of professional activity -system objects, phenomena, processes that sent impact;

the scope of professional activities -a set of objects of professional activity in their scientific, social, economic, productive unwinding;

the basic education programme (OOP) -a set of educational-methodological documentation that includes curriculum, work programmes, training courses, subjects, subjects (modules) and other materials that provide education and training

quality of students, as well as training programs and production practices, academic calendar timetable and methodical materials, to ensure the implementation of appropriate educational technology;

learning outcomes -learned knowledge, skills and competencies mastered;

This document uses the following abbreviations:

HE-Higher education;

CM-the competence model;

UC (YK)-Universal competences;

GPC (OPIK)-general professional competences;

PC (PIK)- professional competence;

PC (PIK-13._) - professional competence master's programm

3. COMPETENCE MODEL

3.1. the purpose of higher education in 14.04.02-nuclear physics and technology "master's program" **Materials for Nuclear Application** "in the field of education and upbringing of the person:

3.1.1. the purpose of education higher education in 14.04.02-nuclear physics and technology "master's program "Materials for Nuclear Application" is:

-training in the field of Humanities, economics, mathematical knowledge, as well as training in scientific knowledge;

-higher professional education to enable graduates profiled successfully work in the sphere of activities related to the design, analysis and evaluation of safety, economy, modern and future nuclear power installations, have sufficient system of analytical skills project management skills.

3.1.2. In the field of education the purpose of higher education is personality formation of socio-personal qualities of the graduates: commitment, communication, communicative and leadership qualities to work in creative teamwork, responsibility for the final result of their professional activities, enhancing the overall culture of professional activity.

3.2. Scope of professional activity of graduates

Area of professional activity of graduates in 14.04.02-nuclear physics and technology "master's program "Materials for Nuclear Application" includes:

studies, expert evaluation, design and technology, aimed at registration and processing of information, theory, creation and use of plants and systems in the

field of Physics of nuclei, particles, nuclear installations, distribution and interaction of radiation with objects of animate and inanimate nature, ensuring nuclear and radiation safety, the safety of nuclear materials and facilities.

3.3. Objects of professional activity of graduates.

The objects of professional activity of graduates in 14.04.02-nuclear physics and technology "master's program "Materials for Nuclear Application" are:

atomic nucleus, elementary particles, nuclear reactors, nuclear materials, reactors, nuclear materials and their security systems, automatic control system of nuclear-physical installations, radiative forcing of ionizing radiation on man and the environment Wednesday, mathematical models for theoretical and experimental studies of the phenomena and regularities in the field of Physics of nuclear reactors, distribution and interaction of radiation with objects of animate and inanimate nature, ensuring the security of nuclear materials, facilities and installations of Atomic Energy and industry.

3.4. Types of professional activity of graduates:

- Research;
- Design;
- expertise;
- technological;
- organization and management;
- pedagogical;
- innovation.

3.5. the objectives of professional activity of graduates in 14.04.02-nuclear physics and technology "master's program "Materials for Nuclear Application":

3.5.1. research activities:

- development of methods for the registration of ionizing radiations and methods for measuring the quantitative characteristics of nuclear materials;
- creating theoretical models of interaction between neutrons and ionizing radiation with matter;
- creation of mathematical models describing processes in nuclear reactors;
- development of methods for increasing the safety of nuclear installations and materials;

3.5.2. Design activities:

- formation of project objectives (programs) to address the challenges of criteria and indicators of achievement, building structure their relationships, identifying priorities for solving tasks, taking into account all aspects of the work;

- development of generalized solutions of this problem, an analysis of these options, forecasting consequences, finding compromise solutions in the face of mnogokriterial'nosti, uncertainty, planning of the project;

- the use of information technologies in the development of new plants and products;

- drafting of technical specifications, standards and technical descriptions of new installations and products;

3.5.3. Expertise activities:

technical analysis and settlement-theoretical consideration of their conformity with the requirements of the legislation in the field of industry, environment and security and other normative acts;

- assessment of conformity of the proposed decision reached world level.

3.5.4. Technological activities:

- development of methods of conducting nuclear physics experiments;

- development of nuclear installations and technologies with high efficiency, safety and security.

3.5.5. Organization and management:

- Organization of the work of performers, performing acceptance decisions under conditions of the spectrum of opinion, determine the order of execution of works;

- search for optimal solutions tailored to the requirements of quality, reliability and value, as well as the timing of performance, safety and environmental protection Wednesday;

- preparation of applications for patents, inventions and industrial designs and the valuation of intellectual activity;

- Organization of work on 17,314 developing draft standards and certificates;

-Organization of work for the implementation of the supervision in the manufacture, installation, commissioning, testing and commissioning of manufactured devices and installations;

-participation in marketing and business plans and implementing release promising and competitive capable devices and installations;

-development of plans and programmes at the enterprise innovation, coordinating personnel for the integrated innovative issues.

3.6. as a result of the development of the programme "Nuclear Physics and technology" Magistracy in preparation of 14.04.02 graduate receives qualification (degree of) master and must possess the following competencies:

3.6.1 Universal competitions:

UK-1 Able to carry out critical analysis of problem situations based on a systematic approach, develop a strategy for action.

UK-2 Able to manage the project at all stages of its life cycle.

UK-3 Able to organize and manage the work of the team, developing a team strategy to achieve the goal

UK-4 Able to apply modern communication technologies, including those in a foreign language (s), for academic and professional interaction.

UK-5 Is able to analyze and take into account the diversity of cultures in the process of intercultural interaction.

UK-6 Able to identify and implement the priorities of their own activities and ways to improve them based on self-assessment.

3.6.2. General professional competences:

GPC-1. Able to formulate goals and objectives of the study, select evaluation criteria, identify priorities for solving problems

GPC-2. Able to apply modern research methods, evaluate and present the results of the work performed

GPC-3. Able to format research results in the form of articles, reports, research reports and presentations using computer typesetting systems and office software packages.

3.6.3. Professional competence:

Organizational and managerial activity:

PC-1 the ability to develop work plans and innovation activities of production units, carry out feasibility studies of innovative projects

PC-2 the ability to use in practical activities the basic concepts in the field of intellectual property, to search for sources of patent information

Scientific research activity:

PC-3 the ability to assess the prospects for the development of the nuclear industry, to use its modern achievements and advanced technologies in research activities

PC-4 the ability to independently perform experimental and theoretical studies to solve scientific and industrial problems.

Design activity:

PC-5 the ability to calculate and design physical installations and devices using modern information technology

PC-6 the ability to assess the risk and determine the safety measures for new installations and technologies, to compose and analyze scenarios of potential accidents, to develop methods to reduce the risk of their occurrence

Pedagogical activity:

PC-7 Capability of mastering the basics of pedagogical and educational work

PC-8 the ability to use teaching materials, laboratory equipment and software for lectures, practical and laboratory classes

Industrial-technological activity:

PC-9 the ability to operate, test and repair modern physical installations, perform technical and economic calculations

PC-10 the ability to solve engineering-physical and economic problems using application packages

Expert activity:

PC-11 Capability of analyzing technical and theoretical design, taking into account their compliance with the requirements of laws in the field of industry, ecology, technical, radiation and nuclear safety and other regulatory acts

PC-12 the ability to objectively evaluate the proposed solution or project in relation to the modern world level, prepare an expert conclusion

innovation activity:

PC-13 the ability to design, create and introduce new products and systems and apply theoretical knowledge in real engineering practice

3.6.4. professional special competence:

PC -13.1 The ability to understand the physical and chemical processes occurring in materials during their production, processing and modification, use knowledge of the methods of research, analysis, diagnostics and modeling of the properties of substances (materials) in research and calculations, carry out complex studies with the use of standard and certification tests

PC -13.2 The readiness to select materials for given operating conditions, taking into account the requirements of reliability and durability, profitability and environmental consequences of their use on the basis of knowledge on the main types of inorganic and organic materials of various purposes, including nanomaterials

PC -13.3 The readiness for professional operation of modern equipment and instruments in accordance with the objectives of the Master's degree program

PC -13.4 The ability to practically use modern ideas of the influence of micro- and nano-structure on the properties of materials, their interaction with the environment, fields, energy particles and radiation.

The head of the master's program,
Professor Kalin B.A.

Competence model of graduate
approved at meeting of Chair

"Theoretical and experimental physics
nuclear reactors»

from _____ year, Protocol No. _____.

AGREED:

Representatives of employers: