

## SPECIALIST MODEL

### 8D7111 "Digitalization of machine-building production"

#### 1 Educational Program Objectives

Training of competitive, qualified personnel with high spiritual and moral qualities, ready to solve scientific, design, research, scientific and pedagogical problems in the context of digitalization of the machine-building complex.

#### 2 Objectives of the educational program

- training of a scientific and pedagogical specialist for the activities of constant self-improvement and self-development, mastering new knowledge, skills and abilities in innovative areas of development of digitalization of machine-building production;
- preparation of doctoral students for a successful career in the field of digitalization of machine-building production, private, public and state organizations, educational institutions, through teaching disciplines that will provide the profiling knowledge, tools, skills and abilities necessary in a competitive environment;
- preparation of scientific and pedagogical personnel, based on the diversity and dynamism of the catalog of elective disciplines of the curriculum, with a predominance of practical skills in competencies, capable of performing professional functions within one or more types of activities based on the final results of training, taking into account the specifics of these types of activities, market requirements for organizational management, professional competencies;
- training of scientific and pedagogical staff as a competitive specialist in the field of digitalization of machine-building production, meeting international standards and allowing Kazakhstan to integrate into the world educational space.

#### 3 Doctoral student in the field of 8D7111 preparation "Digitalization of machine-building production" should be prepared to solve professional problems in accordance with the profile direction of the doctoral program and types of professional activities:

##### *design and engineering activities:*

- analysis of the state of the scientific and technical problem and determination of goals and objectives for the design of instrument systems based on the study of world experience;
- making decisions on the results of calculations for projects and the results of technical, economic and functional-cost analysis of the effectiveness of the designed machine-building systems;

##### *production and technological activities:*

- development of methods for conducting theoretical and experimental studies on the analysis, synthesis and optimization of the characteristics of materials used in mechanical engineering;
- solving economic and organizational tasks of technological preparation of machine systems production and selection of systems for ensuring environmental safety of production;

##### *research activities:*

- construction of mathematical models for analysis and optimization of research objects, selection of a numerical method for their modeling or development of a new algorithm for solving the problem;
- development and optimization of full-scale experimental studies of machine systems taking into account their reliability criteria;

- preparation of scientific and technical reports, reviews, publications on the results of the studies performed;
- application of research results and use of intellectual property rights;
- organizational and management activities:*
  - finding optimal solutions when creating high-tech products, taking into account the requirements of quality, cost, deadlines, competitiveness, life safety, as well as environmental safety;
  - support of a single information space for planning and management of the enterprise at all stages of the product life cycle;
  - development of plans and programs for organization of innovation activity at the enterprise.
- deep knowledge and understanding of fundamental phenomena in their field of science.
- scientific and pedagogical activity:*
  - participation in the development of curricula and courses based on the study of pedagogical, scientific, technical and scientific and methodological literature, as well as the results of their own professional activities;
  - participation in the formulation and modernization of individual laboratory works and workshops in professional disciplines;
  - conducting training sessions with students, participation in the organization and management of their practical and research work;
  - application and development of new educational technologies, including computer and distance learning systems.
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  - application and development of new educational technologies, including computer and distance learning systems.

#### **4 Requirements for the key competencies of doctoral student OP 8D7111 "Digitalization of machine-building production"**

Educational programs in the specialty of doctoral studies meet the requirements of section 2 of the State compulsory standard of postgraduate education, approved by Decree of the Government of the Republic of Kazakhstan No. 1080 of August 23, 2012.

The content of the educational disciplines of the mandatory component is strictly regulated by the State Educational Institution of the Republic of Kazakhstan in 2009. And it is reflected in the

standard curricula of the specialty disciplines. The working curriculum displays the logical sequence of mastering modules and sections of the program (disciplines, practices) that ensure the formation of competencies. The curriculum model combines required components and elective components, the relationship between these two components varies from course to course. To supplement, expand and deepen the training along the selected learning path, elective disciplines are introduced into the curriculum of the specialty in accordance with the State Educational Institution. The educational program of a given direction in the preparation of doctoral students in the specialty is built through the choice of elective disciplines. Doctoral students are provided with the opportunity for an alternative choice of elective educational disciplines.

The educational programme is designed according to the National Qualification Framework for the industry and according to the Dublin Descriptors for Level Three (PhD). When developing educational programs, special attention is paid to the formation of goals to ensure the continuity of their content, taking into account the logic of the academic interconnection of disciplines, their sequence and continuity.

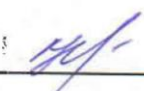
The content of the PhD doctoral program is aimed at achieving the competencies that are spelled out in the program when mastering each module separately and received a review of the modular program of OP 8D07111 "Digitalization of Machine-Building Production."

General competencies of higher education are formed on the basis of requirements for general education, socio-ethical competencies, economic and organizational and managerial competencies, special competencies.

### **5 Competency model of the specialist based on the results of the educational program**

<b>General universal competencies</b>	
GC 1	Able to independently apply methods and means of knowledge, training and self-control to acquire new knowledge and skills, including in new areas that are not directly related to the field of activity
GC 2	Demonstrate the ability to read, write, speak and conduct classes in professional Kazakh (Russian) and conversation in one professional foreign language in the fields of professional activity
GC 3	Able and ready to use modern psychological and pedagogical theories and methods in professional activities in the educational process and research
GC 4	Have skills in creating mathematical models of objects of professional activity
GC 5	Have the skills to develop research plans and programs
GC 6	Have the skills to organize the protection of intellectual property and research results
GC 7	Possess skills in the formation of project (program) goals, criteria and indicators for achieving goals, building a structure of their relationships, identifying priorities for solving problems
GC 8	Apply the acquired basic scientific and theoretical knowledge to solve scientific and
GC 9	Able to formulate and put forward new ideas
<b>Professional competencies</b>	
PC 1	The ability to design and implement comprehensive research, including interdisciplinary, based on a holistic systems scientific worldview using knowledge in the history and philosophy of science
PC 2	Willingness to participate in the work of Kazakhstani and international research teams to solve scientific and scientific-educational problems
PC 3	Willingness to use modern methods and technologies of scientific communication in state and foreign languages

PC 4	Be able to search, select, systematize, analyze, process statistical information, assess its usefulness and purposefully use it to solve the assigned educational, scientific and production tasks
PC 5	Demonstrate the ability to plan and conduct the necessary experiments, interpret the data obtained and draw conclusions
PC 6	Able to develop innovative organization plans and programs
PC 7	activities at the enterprise, assess innovative and technological risks when introducing

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