NCJS «KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY
named after K.I.SATBAYEV»

SPECIALIST MODEL

7M07112 "Digitalization of machine-building production"

1 Purpose of the educational program:

High-quality training of highly qualified and competitive specialists with creative thinking, ready for production, technological, scientific and pedagogical activities in the context of innovative digital engineering.

2 Objectives of the educational program:

- Formation of knowledge of the basics of digital technologies in the field of mechanical engineering;
- acquisition of theoretical and practical knowledge on the organization, conduct of scientific and experimental, research work in the field of development of technological processes of engineering products;
- formation of knowledge and skills in the analysis of scientific and technical information, new methods of control theory, scientific areas of digital engineering;
- formation of knowledge and practical skills of performing scientific and pedagogical activities, application of computer and distance learning forms.

The mission of the educational program of the scientific and pedagogical magistracy of the 7M07112 "Digitalization of machine-building production" is to develop the self-development of an integral personality - a highly qualified specialist, a scientific and pedagogical direction in the field of technology for processing materials under pressure.

Preparation of undergraduates for professional activities and in the field of research methodology; in the field of scientific and scientific-pedagogical activities in higher educational institutions; in matters of modern educational technologies; in the implementation of scientific projects and research in the professional field; in ways to ensure continuous updating of knowledge, expansion of professional skills and abilities.

3 Decomposition of key tasks of the specialty into clusters of "related" competencies.

Master in OP 7M07112 "Digitalization of Machine-Building Production" must solve the following professional problems:

- *research activities:*
- analysis of scientific and technical information, domestic and foreign experience in the field of development and research of digitalization of machine-building production; study of new methods of control theory, artificial intelligence technologies and other scientific areas that make up the theoretical basis for digitalization of machine-building production, compilation and publication of reviews and abstracts;
- theoretical and experimental research in the field of development of new samples and improvement of existing digitalization of machine-building production, their modules and subsystems, search for new additive technologies;
- conducting patent research accompanying the development of new digitalization of machine-building production in order to protect intellectual property objects, research and development results obtained;
- development of experimental samples of digitalization of machine-building production, their modules and subsystems in order to verify and justify the main theoretical and technical solutions to be included in the terms of reference for development work;
- organization and conduct of experiments on the existing digitalization of machine-building industries, their subsystems and individual modules in order to determine their effectiveness and

determine ways to improve, processing the results of experimental studies using modern information technologies;

- preparation of reports, scientific publications and reports at scientific conferences and seminars, participation in the implementation of research and development results in practice;

design and engineering activities:

- preparation of feasibility study of new digitalization projects of machine-building production, their separate subsystems and modules;

- calculating and conducting studies of digitalization of machine-building production, control, information-sensory and executive subsystems using mathematical modeling methods, conducting prototyping and testing of existing systems, processing experimental data using modern information technologies;

- development of special software for solving the problems of designing digitalization of machine-building production, development of terms of reference and direct participation in the design of additive machines and equipment;

organizational and management activities:

- development of organizational and technical documentation (work schedules, instructions, plans, estimates) and established reports according to approved forms;

- organization of work of small groups of performers participating in research, design and development works and in conducting experimental studies;

- control over the implementation of measures to prevent industrial injuries, occupational diseases, prevent environmental violations in the process of research and operation of digitalization of machine-building production;

installation and commissioning activities:

- participation in verification, adjustment, adjustment, assessment of equipment condition and adjustment of digitalization of machine-building production for various purposes, including both technical means and software control systems;

- participation in interfacing software and hardware complexes with technical objects as part of digitalization of machine-building production, in testing and commissioning of prototypes of such systems;

maintenance activities:

- participation in verification, adjustment, adjustment and assessment of the state of digitalization of machine-building production for various purposes, as well as their individual subsystems, in setting up control hardware and software systems;

- preventive monitoring of technical condition and functional diagnostics of digitalization of machine-building production for various purposes, as well as their individual subsystems;

- drawing up operating instructions for digitalization of machine-building production and their hardware and software, development of routine testing programs;

- preparation of requests for equipment and components, preparation of technical documentation for equipment repair;

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.

Master in OP 7M07112- "Digitalization of machine-building production" must have basic competencies in the field of solving organizational and production problems in the implementation

of innovative projects, be prepared to develop plans and programs for organizing innovative activities at the enterprise along the entire chain of innovation cycle "fundamental research - research and development (R&D) - production of new types of products," own modern methods and techniques of working with personnel, methods of creating innovative teams.

The master receives education of a higher quality (level), which should provide him with additional opportunities in the field of professional activity compared to the bachelor, including the right to independently conduct individual works (projects), make the necessary decisions

4 Requirements for the key competencies of the master in OP 7M07112 "Digitalization of machine-building production"

The department "Mechanical Engineering" prepares masters of technology and technology in OP 7M07112- Digitalization of machine-building production. The department is a graduate. The department has developed a modular educational program of the specialty for the entire period of study based on the working curriculum (RUE) of the specialty, a catalog of elective disciplines, taking into account the needs of potential employers.

The results of mastering the master's degree are formulated in terms of "know," "be able," "own," which, in accordance with the adopted structure, are signs of the manifestation of competencies. The master student shall demonstrate the formation of these competencies upon completion of the study of the relevant training cycles and sections of the OP. It should be emphasized that the requirements for the results of the development of OP, fixed by the State Educational Institution, relate only to the basic parts of training cycles and are not tied to specific disciplines. This is due to the fact that, as mentioned above, most competencies are formed, not by a separate discipline: components of competencies are formed in the study of various disciplines, as well as in various types and forms of educational activities.

The structure of the educational program of the 7M07112 "Digitalization of machine-building production" fully complies with the requirements set out in paragraph 110 by Order of the Ministry of Education and Science of the Republic of Kazakhstan dated June 2, 2014 No. 198. "On amendments and additions to the order of the Minister of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152" On approval of the Rules for organizing the educational process on credit learning technology ".

The master's degree program 7M07112 "Digitalization of Engineering Production" was developed in accordance with the National Qualification Framework for the Industry and according to the Dublin Descriptors for the second level (master's degree). The content of OP 7M07112 "Digitalization of machine-building production" meets the requirements of section 2 of the State Compulsory Standards of Higher Education, approved by the Decree of the Government of the Republic of Kazakhstan of August 23, 2012. №1080.

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 Competencies acquired by students in mastering the educational program of the 7M07112 "Digitalization of Machine-Building Production"

General universal competencies	
GC1	Ability 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	Ability and ready to use modern psychological and pedagogical theories and methods in professional activities in the educational process and research
GC 4	Contribute to the humanization of technical education, which will help improve the quality of technical training of an intellectual specialist
GC 5	Have such abilities as: organization, responsibility, frankness, self-confidence, self-criticism, corporatism, reflection, emotional stability, creativity of thinking, adaptability idr.
GC 6	Be able to analyze the state and dynamics of quality indicators of objects of activity using the necessary methods and means of research
GC 7	Have skills in creating mathematical models of objects of professional activity
GC 8	Have the skills to develop research plans and programs
GC 9	Be able to analyze and synthesize objects of professional activity
GC 10	Have the skills to organize the protection of intellectual property and research results
GC 11	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
Professional competencies	
PK 1	Ability to critically analyze and evaluate modern scientific achievements, generate new ideas when solving research and practical problems, including in interdisciplinary fields
PK 2	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
PK 3	Willingness to participate in the work of Kazakhstani and international research teams on the decision of scientific and scientific-educational задач
PK 4	Willingness to use modern methods and technologies of scientific communication in state and foreign languages
PK 5	Ability to follow ethical standards in professional activities
{K 6	Ability to plan and solve tasks of own professional and personal development
PK 7	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
PK 8	Demonstrate the ability to plan and conduct the necessary experiments, interpret the data obtained and draw conclusions

Head of the Department of Mechanical Engineering _____ **Nugman E.Z.**

Discussed at the meeting of the Department of Mechanical Engineering
Protocol No. 1 dated August 22, 2024.