NJSC "S. Seifullin Kazakh Agrotechnical Research University"

Considered
at the meeting
faculty council

Protocol № 10

from « 26 » 12 2023.

Approved

Dean of the Technical Faculty

Y.S. Akhmetov

« 26 » 12 2023

DEVELOPMENT OF THE EDUCATIONAL PROGRAM PLAN

8D07105-Mechanical engineering
by group of educational programs
D103 - Mechanics and metalworking (metal processing)
for 2024-2029

Considered at an extended meeting of the department
Technological machines and equipment
Protocol № 01 of 28.08.2023

Content

1 Passport of the educational program development plan 8D07105-Mechanical Engineering for 2024/2029

1	Basis for developing an educational program development plan	1) The development plan of the educational program 8D07105-Mechanical Engineering is necessary for the preparation of competitive PhD doctors in the scientific and pedagogical direction, possessing modern competencies and skills, equipment and technologies that contribute to solving issues arising at industrial enterprises, specialized research and educational organizations by providing deep theoretical knowledge and practical experience in the field of technological machines and equipment. 2) Many years of experience in the educational activities of KATRU in domestic and international practice, which is one of the traditional and innovative universities in Kazakhstan, the personnel and scientific potential of the department, faculty and the university as a whole. 3) The task of fulfilling the social order of society for the development and formation of in-demand personnel in the labor market who possess the theoretical and practical foundations for improving the technological processes of manufacturing and assembling industrial products
2	Key Plan Developers educational program development	The staff of the Department of Technological Machines and Equipment, employers, partner universities and other interested parties (taking into account the requests of real and potential stakeholders of the educational program)
3	Time frame for implementing the educational program development plan	The entire training period is 2024 - 2029. (the foresight method established a short-term forecast with a depth of up to 5 years)
4	Volume and sources of funding	-
5	Expected final results of the plan implementation educational program development	Obtaining deep theoretical and practical knowledge and skills, which presupposes a clear orientation of students towards successful professional activities, personal growth that meets the requirements of employers. Formation of the image of KATRU as a key educational and expert organization in the field of production of parts, mechanisms, machines and industrial products among scientific and educational institutions of the republic and Central Asia.

2. Analytical justification of the educational program

2.1 Information about the educational program

The educational program 8D07105-Mechanical Engineering is aimed at training highly qualified, competitive personnel, improving the quality of knowledge, forming a multi-level system of research activities in accordance with the current needs of modern education and science, a harmoniously developed personality of a specialist in the field of improving technological processes for manufacturing parts, mechanisms, machines, technological equipment and other types of industrial products.

The educational program was developed jointly with professors from the University of California at Davis (USA), AGH University in Krakow (Poland) and taking into account the recommendations of leading experts from leading industrial enterprises, in accordance with the NQF and professional standards, agreed with the Dublin descriptors and the European Qualifications Framework, on the basis of the State Compulsory Standard of Higher Education, doctoral studies, approved by the order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018 (No. 604), the classifier of specialties of higher and postgraduate education of the Republic of Kazakhstan, educational program and methodological documentation, individual work plans for doctoral students and other documents, approved in accordance with the established procedure.

An educational program of an interdisciplinary and multidisciplinary nature, which provides training at the intersection of a number of areas of knowledge, is generally focused on preparing qualified competitive personnel for professional activities in all sectors and provides for broad basic professional training, which should be aimed at achieving fundamental knowledge of future specialists.

2.2 Information about students

Information on the number of students in the educational program 8D07105-Mechanical Engineering:

Educational program	Academic years			
	2020-2021	2021-2022	2022-2023	2023-2024
6B07105-Механическая инженерия	5	5	6	6

2.3 Internal conditions for the development of the educational program

For the development and implementation of the educational program 8D07105-Mechanical Engineering, the department has created favorable and optimal conditions such as:

- highly qualified teaching staff;
- high material and technical equipment of the educational program;
- training in three languages (multilingual training);
- close cooperation with employers;
- modern educational and methodological base, with students' access to information and analytical resources of the world scientific world;
- use of modern and interactive TSO;
- educational laboratories, centers, workshops and platforms (educational resources) are equipped with special equipment and materials for conducting laboratory and practical classes, the functioning of which guarantees the training of highly qualified specialists of modern times:

Scientific and experimental platform of agroengineering:
- Laboratory of mechatronics and applied robotics;
- 3D visualization laboratory;
- Production and experimental metalworking and welding workshop;
- Design department.

Scientific and experimental platform for processing agricultural products:
- Experimental production workshop of vegetable oil;
- Experimental production workshop for milk processing;
- Experimental production workshop for the production of bread and bakery products;
- Experimental production workshop for meat processing;
- Laboratory of deep processing of plant raw materials.

International scientific and educational centers:
- Kazakh-Belarusian center for training and retraining of personnel;
- Kazakh-Chinese center for agricultural mechanization;
- Kazakh-German Center for Precision Agriculture.

There are also:
- Laboratory of Materials Science and TCM;
- Laboratory "Installation and operation of technological machines";
- Training workshops.

All classrooms are equipped with digitalization systems for the educational process.

2.4 Characteristics of the surrounding society

Pedagogical and research practices are carried out on the basis of the departments of "Technological machines and equipment", "Agricultural technology and technology" and "Technology of food and processing industries"

of the Technical Faculty. For research practice there is a scientific and experimental platform for agricultural engineering, a scientific and experimental platform for processing agricultural products and a laboratory for deep processing of plant raw materials

Every year, representatives from partner production facilities, as well as foreign leading teachers from partner universities, are invited to give lectures. In order to develop academic mobility, close cooperation is being carried out with the Belarusian State Agrarian Technical University, the Russian State Agrarian University - Temiryazev Moscow Agricultural University and AGH University in Krakow (Poland), and the search for new partner universities among foreign countries, customs union countries and the CIS continues.

2.5 Information about the teaching staff implementing the educational program

The degree level of the department "Technological machines and equipment" is 70%. The educational program is served by highly qualified teaching staff of the university. The total number of teaching staff as of September 1, 2023 was 28 people (full-time - 25), including 2 doctors of technical sciences, 5 doctors of philosophy (PhD), 13 candidates of science and 8 teachers (masters) with academic degrees.

The teaching staff of the Department of "Technological Machinery and Equipment" constantly improves their knowledge in this industry and undergoes advanced training, including short-term advanced training courses, attending various kinds of seminars, internships at leading universities in Kazakhstan, near and far abroad, as well as in relevant industry organizations.

2.6 Characteristics of educational program achievements

In 2019, the educational program 8D07105-Mechanical Engineering successfully passed independent specialized accreditation by the Independent Agency for Accreditation and Rating (hereinafter referred to as IAAR), as a result of which, by the decision of the IAAR Accreditation Council, the educational program was accredited and awarded a certificate for a full period of 5 years.

According to the results of the annual national ranking of the IAAR for higher educational institutions, the educational program 6B07104-Technological machines and equipment takes a leading place: for example, 2021 - 1st place, 2022 - 1st place, 2023 - 2nd place.

3. Characteristics of the problems that the educational program development plan is aimed at solving and justification for the need to solve them

The educational program 8D07105-Mechanical Engineering was created to train personnel to carry out professional activities in the field of creating and improving technological machines and equipment.

Trained personnel must have the skills to study the state of the regulatory and technical support of the system, possess the skills of scientific-production, organizational-managerial and research work, capable of conducting experimental and theoretical research on modern problems in the field of mechanical engineering.

Trained personnel should increase the percentage of publication of scientific articles of their research in the field of creating and improving technological machines and equipment in domestic and foreign publications with a non-zero impact factor.

Information on publications of the teaching staff of the department "Technological machines and equipment", the depth of analysis is 3 years.

Publications	**2020**	**2021**	**2022**
in the database I ISI Web of Knowledge (Q1-Q4)	**-**	**-**	**4**
in the databaseScopus	**3**	**10**	**23**
other foreign databases, RSCI	**4**	**8**	**11**
publications recommended by CQASHE MSHE RK	**6**	**9**	**3**
other publications	**29**	**22**	**9**
Patenting of intellectual property objects	**5**	**5**	**2**
All publications	**45**	**54**	**52**

Trained personnel must speak English at least at the C1 Advance level. Currently, the university offers English language courses such as DynEd and IELTS.

4. The educational program 8D07105-Mechanical Engineering was created based on requests from employers.

The main goal of the educational program and its development is to prepare competitive PhD doctors in the scientific and pedagogical direction, possessing modern competencies and skills, equipment and technologies that contribute to solving issues arising at industrial enterprises, specialized research and educational organizations by providing deep theoretical knowledge and practical experience in the field of technological machines and equipment.

The main objectives of the development plan are the following:

№	Task name	Development timeframe	Stages of development
1	Providing conditions for obtaining full-fledged, high-quality professional education	The entire Study period 2024 – 2029.	Development of measures to improve the quality of educational services to develop professional skills of future specialists
2	Formation of basic	The entire Study	Updating the content of the

	professional competencies among future specialists	period 2024 – 2029.	educational program. Acquisition of professional competencies in the field of creation and improvement of technological machines and equipment.
3	Ability to work with scientific and technical information, use domestic and foreign experience in professional activities, systematize and summarize the information received	The entire Study period 2024 – 2029.	Development of measures for analyzing and processing the results obtained
4	Consultations for employers and research institute scientists when choosing relevant and practically significant topics for theses and master's and doctoral dissertations	End of bachelor's degree and beginning of master's degree	Consultations for employers and stakeholders

5. Measures to reduce the impact of risks for the educational program

When implementing educational programs to reduce risks, the following measures are applied:

№	Name of possible risks	Measures to eliminate them
1	Insufficient provision of educational and methodological literature on professional disciplines in the state and English languages	Plan the annual publication by scientists and teaching staff of scientific and educational literature in the state and English languages, according to the students' working curriculum
2	Traditional way of conducting classes	Improve and introduce innovative technologies of teaching and provision of educational services into the educational process at the level of world standards
3	Outdated training and laboratory facilities	Creation of a modern educational, research and laboratory base based on public-private partnership, purchase of modern laboratory equipment
4	Lack of scientific and teaching personnel due to retirement	Training of highly qualified scientific personnel through master's and doctoral studies (PhD) at the level of modern requirements
5	Small academic groups of students	Formation of a contingent of students in

	studying in Russian	this profile through career guidance and information and advertising work, creation of multilingual training groups

6. Action plan for the development of the educational program

№	Name of events	Implementation deadlines	Responsible	Expected results
1	Formation of a working group to develop an educational program for 2024-2029.	November 2024 - April 2025 (further annually until 2029)	Head of the department	Formed team of authors
2	Development of goals and objectives of the educational program for 2024 - 2029.	November 2024 - April 2025 (further annually until 2029)	Head of the department, author's team of the educational program	Developed goals and objectives of the educational program
3	Determination of specialist competencies and specialty disciplines for 2024-2029.	November 2024 - April 2025 (further annually until 2029)	Head of the department, author's team of the educational program	Developed positions on competencies
4	Formation and coordination of specialist competencies and specialty disciplines with Dublin descriptors	November 2024 - April 2025 (further annually until 2029)	Head of the department, author's team of the educational program	Formed and agreed competencies
5	Formation of an educational program in accordance with professional standards	November 2024 - April 2025 (further annually until 2029)	Head of the department, author's team of the educational program	Formed educational program
6	Drawing up an academic calendar and working curriculum for the specialty in accordance with the developed educational program	April 2025 (further annually until 2029)	Head of the department	Academic calendar and working curriculum

7	Consideration of the educational program at an extended meeting of the department with the participation of employers	May-June 2024 (further annually until 2029)	Stakeholders (faculty and teaching staff of the department, employers, etc.)	Discussion of the educational program
8	Review and approval of the educational program by the Faculty Academic Council	May 2024 (further annually until 2029)	Members of the Council of the Technical Faculty, employers	Approval of the educational program

7. Mechanism for implementing the educational program development plan

The plan is implemented in accordance with the assigned tasks:

- providing conditions for obtaining high-quality vocational education by introducing innovative teaching technologies into the educational process at the level of world standards;
- based on the results of the obtained theoretical knowledge, the formation of basic professional competencies;
- creation of prerequisites for independent research activities of the student as part of the experiment at all its stages;
- developing skills in the ability to work with scientific and technical information, systematize and summarize the information received;
- at the final stage, selection of relevant and practically significant topics for diploma projects, master's and doctoral dissertations.

8. Assessment of the socio-economic efficiency of the implementation of the educational program development plan

When implementing an educational program development plan, it is effective to:

- the possibility of concluding agreements with universities near and far abroad;
- formation of a contingent of students;
- creation of a modern educational, research and laboratory base;
- the possibility of organizing professional practices on the basis of leading enterprises in foreign countries;
- training of highly qualified scientific personnel through master's and doctoral studies (PhD) at the level of modern requirements.

9. Educational program graduate model

Competency model (portrait) of a graduate –
Doctor of Philosophy (PhD)

Professional field of Doctor of Philosophy (PhD) (scientific, pedagogical and specialized areas):

- research work;
- management activities;
- production and technological activities;
- information and project activities.
- organization and management of services of production enterprises;
- development of structures of production and technological, service and operational, installation and commissioning and design departments;
- creation and improvement of technological machines and equipment.

General educational competencies

- master the methodology of a systematic approach to the organization, modern approaches to management and analytical methods of management, methods of diagnosis, analysis and problem solving, as well as methods of decision-making and their implementation in practice;
- solve skillfully practical management problems and implement these decisions, be prepared to perform management functions and be able to solve professional problems in the interests of the organization as a whole;
- have the knowledge, skills and abilities necessary to occupy the relevant managerial position and based on a deep understanding of the characteristics of a market economy and its capabilities, functions and economic role of the state, understanding of environmental problems, awareness of the social responsibility of business and adherence to civilized ethical standards of its conduct:
- be able to assess current problems and prospects for the socio-economic development of Kazakhstan, understand current trends in the development of the world economy and globalization, and navigate issues of international competition.

Basic competencies

- demonstrate a systematic understanding of the field of study, mastery of the skills and research methods used in this field;
- demonstrate the ability to think, design, implement and adapt a significant research process with a scientific approach;
- contribute with their own original research to expanding the boundaries of the scientific field, which deserves publication at the national or international level;
- critically analyze, evaluate and synthesize new and complex ideas;
- communicate your knowledge and achievements to colleagues, the scientific community and the general public;

- promote, in academic and professional contexts, the technological, social or cultural development of society based on knowledge.

Professional competencies

Organizational and technological activities:

- development of design, technological, design and estimate documentation for the creation and repair of technological machines and equipment;
- organizing the work of a team of performers, taking into account different opinions and making management decisions;
- compromise solutions taking into account various requirements (cost, quality, deadlines and safety) for different types of planning and determining optimal solutions;
- accounting for various types of costs in order to ensure the release of high-quality products.

Production and management activities:

- optimization of manufacturing technologies for technological machines and equipment;
- quality control of technological processes, materials and finished products;
- selection and effective use of materials, equipment and other means for the implementation of production processes;
- metrological verification of means for measuring product quality indicators;
- carrying out activities for standardization and certification of technological machines and equipment, technologies for their manufacture and repair;
- organization and management of services and enterprises related to the operation and repair of technological machines and equipment.

Project activities:

- defining the goals and objectives of the project, taking into account various factors when building the structure of their relationships and identifying priority areas for solving problems;
- development and analysis of options for solving problems of predicting consequences, planning and implementation of projects;
- development of projects for technological machines and equipment, taking into account technological, design, aesthetic, economic and other parameters;
- use of information technology in the selection of materials, technological machines and equipment.