Ф.7.02-09

MINISTRY OF SCIENCES AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN

M.AUEZOV SOUTH KAZAKHSTAN UNIVERSITY

«APPROVED»
Chairman of the Board-Rector
Doctor of historical sciences,
Academician Kozhamzharova D.P.
«23» 01 2023 г.

# EDUCATIONAL PROGRAM

## 8D07180 – Technological machines and equipment (on branch)

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| Registration number | 8D07100008 |
| Code and Classification of Education | 8D07 - Engineering, proccessing and contruction branches |
| Code and Classification of Areas of Training | 8D071 - Engineering and engineering business |
| Group of educational programs (EP) | D103 - Mechanics and metalworking |
| Type of EP | current |
| ISCE level | 8 |
| NQF level | 8 |
| SQF level | 8 |
| Language of learning | Kazakh, Russian |
| The complexity of EP | 180 credits |
| Distinctive features of EP | - |
| Partner University (JEP) | - |
| University partner (DDEP) | - |

Shymkent, 2023

Drafters:

| Name | Position | Sign |
|---|---|---|
| Seitkhanov N.T. | Candidate of Technical Sciences, Head of the department "Technological machines and equipment" | |
| Volnenko A.A. | Doctor of Technical Sciences, professor of the department "Technological machines and equipment" | |
| Korganbaev B.N. | Doctor of Technical Sciences, Senior Lecturer of the Department "Technological Machines and Equipment" | |
| Khusanov A.E. | Candidate of Technical Sciences, Senior Lecturer of the Department "Technological Machines and Equipment" | |
| Zhumadullaev D.K. | PhD, Senior Lecturer of the Department "Technological Machines and Equipment" | |
| Abzhapbarov A.A. | Group doctoral student DNG-20-4r | |
| Khairov A.N. | Director of the SKF of JSC "NGSK KazStroyService" | LS |
| Torskiy A.O. | Technical Director of LLP "Kazmontazhstroykonstruktsiya" | LS |

The EP was considered in the direction of training "Engineering and Science in Engineering", at a meeting of the academic committee, Minutes № 6 «14» 02 2023.

Chairman of the Committee _____ Aitureev M.

The EP was considered and recommended for approval at Educational-methodical meeting of M. Auezov SKU

Minutes № 4* from «22» 02 2023.

Chairman of the EMM _____ Abisheva R.D.

The EP was approved by the decision of the Academic Council of the University

Minutes № 13 from «23» 02 2023.

**CONTENT**

## 1 CONCEPT EP

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| **Mission of the University** | We are focused on generating new competencies, training a leader who translates research thinking and culture. |
| **University Values** | – Openness - open to change, innovation and cooperation.<br>– Creativity - generates ideas, develops them and turns them into values<br>– Academic freedom - free to choose, develop and act.<br>– Partnership - creates trust and support in a relationship where everyone wins.<br>– Social responsibility - ready to fulfill obligations, make decisions and be responsible for their results. |
| **Graduate Model** | – Deep subject knowledge, their application and continuous expansion in professional activity<br>– Information and digital literacy and mobility<br>– Research skills, creativity and emotional intelligence<br>– Entrepreneurship, independence and responsibility for their activities and well-being<br>– Global and national citizenship, tolerance to cultures and languages |
| **Uniqueness of the EP** | the program was developed in accordance with the Atlas of New Professions and Competencies, and is aimed at training competent specialists for transport and logistics and scientific and pedagogical structures who are able to organize and manage the activities of a structural enterprise, independently determine the goals of professional activity, choose and justify methods and means to achieve them. |
| **Academic Integrity and Ethics Policy** | The University has taken measures to maintain academic integrity and academic freedom, protection from any kind of intolerance and discrimination:<br>• Rules of academic integrity (Order No. 212-нқ dated 10.10.2022);<br>• Anti-Corruption Standard (Order No. 221-нқ dated 07.12.2021).<br>• Code of Ethics (order No. 212-нқ dated 10.10.2022).<br>• Anti-Corruption Policy of the NJSC "M. Auezov South Kazakhstan University." (order No. 144 нқ dated 07.14.2022). |
| **Regulatory and legal framework for the development of EP** | 1. Law of the Republic of Kazakhstan "On Education" No. 319-III dated July 27, 2007;<br>2. Standard rules of activity of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by Order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595<br>3. State obligatory standards of higher and postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated July 20.2022 No. 2;<br>4. Rules for the organization of the educational process on credit technology of training, approved by the Order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152;<br>5. Qualification directory of positions of managers, specialists and other employees, approved by the Order of the Minister of Labor and Social |

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| | Protection of the Population of the Republic of Kazakhstan on December 30, 2020 No. 553.<br>6. Guidelines for the use of ECTS.<br>7. Guidelines for the development of educational programs of higher and postgraduate education, Appendix 1 to the order of the Director of the Central Research Institute No. 45 o/d dated June 30, 2021. |
| **Organization of the educational process** | – Implementation of the principles of the Bologna Process<br>– Student-centered learning<br>– Availability<br>– Inclusivity |
| **Quality assurance of EP** | – Internal quality assurance system<br>– Involvement of stakeholders in the development of the EP and its evaluation<br>– Systematic monitoring<br>– Updating the content (updating) |
| **Requirements for applicants** | They are established according to the Standard Rules of admission to training in educational organizations implementing educational programs of higher and postgraduate education Order of the Ministry of Education and Science of the Republic of Kazakhstan No. 600 dated 31.10.2018 |
| **Conditions for the implementation of educational programs (EP) for persons with disabilities and special educational needs(SSN)** | For students with SEN (special educational needs) and persons with disabilities (PSI), tactile PVC tiles, specially equipped toilets, a mnemonic diagram, and shower bars have been installed in educational buildings and student dormitories. Special parking spaces have been created. Crawler lift installed. There are desks for people with limited mobility (PLM), signs indicating the direction of movement, ramps. In the educational buildings (main building, building No. 8) there are 2 rooms with six working places adapted for users with disorders of the musculoskeletal system (DMS).For visually impaired users, the SARA™ CE Machine (2 pcs.) is available for scanning and reading books. The library website is adapted for the visually impaired. There is a special NVDA audio program with a service. The JIC website http://lib.ukgu.kz/ is open 24/7.<br>An individual differentiated approach is provided for all types of classes and in the organization of the educational process. |

## 2. PASSPORT EP

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| **Purpose of the EP** | Preparation of highly qualified scientific and pedagogical personnel capable of conducting research in the field of technological machines and equipment, developing innovative technical and technological solutions, and also carrying out pedagogical activities. |
| **Tasks of the EP** | • providing fundamental knowledge in the field of machine engineering and technological processes and related sciences, due to the needs of the state and market, scientific, practical and educational activities of institutions engaged in the training of doctors by specialty;<br>• providing an individual educational trajectory of study in accordance with the chosen specialty of doctoral students;<br>• providing high-grade and high-quality scientific-pedagogical education, to form professional competence, to deepen theoretical and practical, as well as individual training of doctoral students in the field of technological machines and equipment. |
| **Harmonization of EP** | • 8 th level of the National Qualifications Framework of the Republic of Kazakhstan;<br>• Dublin descriptors of the 8 th level of qualification;<br>• 3 cycle of a Framework for Qualification of the European Higher Education Area);<br>• 8 th Level of European Qualification Framework for Life long Learning). |
| **Connection of EP with the professional sphere** | • Professional standard. Testing of innovative products / services - Appendix No. 2. NCE RK "Atameken", 12/24/2019. No. 259.<br>• Professional standard. Organization of interaction between science and innovators - Appendix No. 1. NCE RK "Atameken", 12/24/2019. No. 259.<br>• Professional standard. Technical design of innovative products / services - Appendix No. 12. NCE RK "Atameken", 12/24/2019. No. 259.<br>• Professional standard. Development of working documentation for innovative products / services - Appendix No. 8. NCE RK "Atameken", 12/24/2019. No. 259.<br>• Professional standard. Development and transformation of innovative ideas - Appendix No. 9. NCE RK "Atameken", 12/24/2019. No. 259.<br>• Sectoral Qualifications Framework "Education" - Astana, 2019 |
| **Name of the degree awarded** | Persons, who have mastered the EP of doctoral studies and defended a doctoral dissertation, with a positive decision of the dissertation councils of the OHPE with a special status or the Committee for Quality Assurance in Education and Science of the Ministry of Science and Higher Education of the Republic of Kazakhstan, are awarded the PhD degree on the EP «8D07180 - Technological Machines and Equipment (on branch)» |
| **List of qualifications and positions** | Head of Innovative Development; project manager; Chief Engineer; chief mechanic; managerial positions in higher educational institutions and research institutions, as well as design and design organizations without presenting requirements for work experience in accordance with the qualification requirements of the Qualification Directory for the positions of managers, specialists and other employees, approved by order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated December 30, 2020 No. 553. |
| **Field of professional activity** | • scientific and management activities in research and production centers, research institutes;<br>• management activities in the structural units of the Ministry of Education and Science, the Committee on environmental protection, the department of |

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| | industrial development and industrial safety and district akimats.<br>• pedagogical activity, production activity in experimental research, project organizations and in the industry; experimental-research activities in the field of education and in the industry in the field of advanced training of workers in accordance with the specialization; |
| **Objects of professional activity** | • organizations and enterprises of any form of ownership, which are engaged in the design and operation of technological machines and equipment;<br>• central and local governments, where questions of equipment and modernization of processes and technologies are being resolved;<br>• research institutes and organizations;<br>• enterprises and organizations working on the Industrialization Map;<br>• higher education institutions;<br>• machine engineering plants producing technological equipment; enterprises and organizations that operate technological equipment: design, project and technological organizations; branded and dealer centers of machine-engineering and repair plants; marketing and transport-expediting services; logistics systems. |
| **Subjects of professional activity** | • planning and organization of scientific research in the field of machine engineering and technological processes for solving specific research, information-retrieval, methodical tasks on the basic processes and devices of chemical technologies;<br>• carrying out work on the development of technological machines and devices, energy-saving technologies in various industries;<br>• organization of the educational process in educational organizations by profile;<br>• organization and implementation of measures on the development of methods for designing and calculating high-performance heat and mass transfer devices and devices for general industrial usage. |
| **Types of professional activity** | • production-technology;<br>• organizational-managerial;<br>• research;<br>• pedagogical;<br>• design and engineering |
| **Learning outcomes** | **LO1.** Develop innovative approaches to the creation and design of devices with a movable and regular packing for heat and mass transfer and dust collection processes, including combined and conjugate methods of phase interaction.<br>**LO2.** Use highly efficient methods for mass and heat transfer, hydromechanical, coupled and combined processes to optimize the parameters of process equipment.<br>**LO3.** Create mathematical and hydrodynamic models that allow predicting and optimizing processes in the field of technological machines and equipment, taking into account a large-scale transition.<br>**LO4.** Carry out research work, including the implementation of scientific research and the development of new technical and technological solutions using advanced methods and tools.<br>**LO5.** Apply modern tools and software for modeling, simulation and analysis of processes in the field of technological machines and equipment.<br>**LO6.** Possess the skills of systematic work, planning and organization of research projects in the field of technological machines and equipment. |

## 3. COMPETENCIES OF A GRADUATE OF THE EP

| **GENERAL COMPETENCIES** (SOFTSKILLS). Behavioral skills and personal qualities | |
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| **GC 1. Competence in managing one's literacy** | GC1.1. Ability to solve problems of their own professional and personal development;<br>GC1.2. The ability to use logical thinking to make decisions and implement them in practice. |
| **GC 2. Language competence** | GC2. Ability to possess the skills of scientific communication in a foreign language, competent communication in scientific and professional activities. |
| **GC 3. Mathematical competence and competence in the field of science** | GC3. The ability to professionally use information technology for mathematical processing of scientific data, communication and exchange |
| **GC 4. Digital competence, technological literacy** | GC4. The ability to be productive in the subject area on the basis of information and computer technologies, relying on existing experience and constantly improving and expanding its boundaries |
| **GC 5. Personal, social and educational competencies** | GC5.1. The ability to creatively analyze and evaluate modern scientific achievements, modern problems and prospects of socio-economic development of Kazakhstan;<br>GC5.2. The ability to generate ideas, predict the results of innovative activities, implement large-scale changes in the professional and social sphere |
| **GC 6. Entrepreneurial competence** | GC6.1. The ability to develop creative and entrepreneurial skills of the team, to be prepared for the implementation of management functions and to solve professional problems in the interests of the organization as a whole based on a deep understanding of the features of the market economy, the functions and economic role of the state;<br>GC6.2. Ability to manage complex production processes and scientific projects with decision-making in conditions of uncertainty and risk. |
| **GC 7.Cultural awareness and self-expression** | GC7. Ability to demonstrate awareness of social responsibility and commitment to civilized ethical standards of behavior in scientific work and business |
| **PROFESSIONAL COMPETENCIES** (HARDSKILLS). | |
| Theoretical knowledge and practical skills specific to this field | PC1. The ability to professional exploitation of modern technological equipment and scientific instruments in accordance with the direction of training and to independently learn new research methods, to change the scientific and scientific-production profile of their professional activities. |
| | PC2. Skills of planning, organizing and conducting research in the field of chemical technology and proficiency in programming and calculating basic processes and equipment. |
| | PC3. The ability to conduct a detailed analysis of scientific and technical information in the field of technological machines and equipment and related disciplines for the purpose of scientific, patent and marketing support of the conducted fundamental research and technological developments. |
| | PC4. The ability to analyze and comprehend the realities of modern theory and practice based on the methodology of natural science knowledge and apply these teaching methods in practice and to develop a quality management system in the creation of technological machines and equipment in accordance with the requirements of |

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| | Kazakhstan and international quality standards. |
| | PC5. The ability to assess the public and environmental impacts of practical activities based on in-depth knowledge of safety and environmental protection requirements, as well as legislative foundations, and apply the principles of rational usage of natural resources and environmental protection in practice. |
| | PC6. The ability to implement technological processes of chemical production and show the skill of analytical thinking in solving problems and their proper documentation. |

**3.1 Matrix of correlation of EP learning outcomes in general with modules formed by competencies**

| | LO1 | LO2 | LO3 | LO4 | LO5 | LO6 |
|---|---|---|---|---|---|---|
| GC1 | + | | | | | |
| GC2 | + | | | | | |
| GC3 | | + | | + | | |
| GC4 | | | | | | |
| GC5 | | + | + | | | |
| GC6 | | | + | | | |
| GC7 | | | + | | | |
| PC1 | | + | | + | + | + |
| PC2 | | + | + | + | + | |
| PC3 | | | + | + | + | |
| PC4 | | | | + | + | |
| PC5 | + | + | | + | + | + |
| PC6 | | + | | | + | |

## 4. MATRIX OF THE INFLUENCE OF MODULES AND DISCIPLINES ON THE FORMATION OF LEARNING OUTCOMES AND INFORMATION ON LABOR INTENSITY

| № | Module name | Cycle | Component | Component Name | Brief course description | Number | Generated learning outcomes (codes) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LO 1 | LO 2 | LO 3 | LO 4 | LO 5 | LO 6 |
| 1 | Scientific Research Methods and Academic Writing | BD | UC | Academic writing | Purpose: To develop academic writing skills and effective use of Scopus and Web of Science databases in scientific research. Contents: Planning and organizing written work: setting a goal, choosing a topic, drawing up a plan. Analysis and critical thinking: collection and evaluation of sources, formation of one's own opinion. Familiarization with the Scopus database and its functionality. Methods for searching and filtering scientific articles by subject and criteria. Analysis and evaluation of the relevance and authority of the articles found. Using the Web of Science database for literature review. Correct citation and formatting of bibliography. Evaluation of the quality of scientific journals and conferences. Practical use of databases in scientific work. | 3 | | | | v | | v |
| | | BD | UC | Scientific research methods | Purpose: To develop doctoral students' competencies in conducting qualitative research, including formulating and testing hypotheses, collecting and analyzing experimental data, evaluating results, and | 4 | | | | v | v | v |

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| | | | | | interpreting conclusions.<br>Content: Use of qualitative and quantitative methods for collecting information. Data processing and interpretation. Statistical analysis of results. Using software for statistical analysis. Experiment planning. Choice of observation and measurement methods. Processing and analysis of experimental data. Development of mathematical models for the description and analysis of technical processes. Use of computer programs and simulators for modeling and optimizing processes. Comparison of simulation results with experimental data. Analysis and explanation of the obtained results. | | | | | | | |
| | | BD | EC | Devices With a Mobile and Regular Nozzle for the Processes of Heat and Mass Transfer and Dust Collection | Purpose: to study the principles of operation, design and use of devices with a movable and regular nozzle for efficient heat and mass transfer and dust collection in various technological processes.<br>Contents: Basic principles of operation and classification of devices. Heat and mass transfer apparatus with a movable nozzle. Heat transfer and basic methods of heat and mass transfer. Principles of operation and design of heat and mass transfer apparatus with a movable nozzle. Apparatus with a regular nozzle for dust collection. Principles of operation and design of devices with a regular nozzle. Basic principles for designing devices with movable and regular | 6 | v | v | | | | |

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| | | | | | nozzles. Criteria for selecting devices depending on the specific conditions and requirements of the process. | | | | | | | |
| | | BD | EC | Methods for Conducting Crystallization | Purpose: Formation of skills and knowledge on the principles and methods of crystallization to obtain pure and high-quality crystals in various processes and industries.<br>Contents: Main characteristics of crystalline materials. Phase diagrams and crystallization conditions. Basic methods of crystallization. Control and optimization of the crystallization process. Study of the influence of process parameters on the quality of crystals. Methods for monitoring and analyzing the quality of crystals. Crystallization in the chemical industry. Crystallization in the food industry. Experimental equipment and methods for carrying out crystallization. Research and innovation in the field of crystallization. | 6 | v | v | | | | |
| | | BD | UC | Pedagogical practice | Purpose: development of pedagogical skills and competencies among doctoral students, preparing them for teaching in higher education.<br>Content: Teaching methods and development of teaching materials. Organization and planning of the educational process. Development of pedagogical competence and professional identity. Planning and organization of the educational process. Teaching methods and | 10 | | | | v | | v |

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| | | | | | interaction with trainees. Evaluation and control of student progress. Professional development of the teacher. The use of information and communication technologies in educational practice. | | | | | | | |
| 2 | Heat and mass transfer processes, mathematical and hydrodynamic modeling and membrane processes | PD | UC | Heat and Mass Transfer Processes in Processing Industries | Purpose: Study of the main processes of heat and mass transfer used in the processing industries.<br>Contents: Fundamentals of heat and mass transfer. Heat transfer: convection, conduction, radiation. Mass transfer: diffusion, convection, evaporation. Heat and mass transfer in industrial processes. Equipment for heat and mass transfer: heat exchangers, evaporators, condensers. Heat and mass transfer in various industries. Basic methods of heat and mass transfer. Modeling and calculation of heat and mass transfer processes. Technical aspects of heat and mass transfer. Selection and operation of equipment for heat and mass transfer. Control and regulation of heat and mass transfer processes. Energy efficiency and reduction of heat and mass transfer losses. | 6 | v | v | | | | |
| | | PD | EC | Mathematical and Hydrodynamic Modeling at Scale Transition | Purpose: To study the basic principles and methods of mathematical modeling and hydrodynamic modeling in the transition from laboratory and pilot tests to real large-scale processes.<br>Contents: Fundamentals of mathematical modeling. Hydrodynamic modeling. Different approaches to hydrodynamic | 6 | | | v | | v | |

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| | | | | | modeling. Large transitions. Problems of scaling in hydrodynamic modeling. Practical application of modeling in scaling. Examples of real scale processes and their modeling. Trends and challenges in the field of mathematical and hydrodynamic modeling during scaling. Problems and prospects in the application of modeling in practice. | | | | | | | |
| | | PD | EC | Modeling of Chemical Technology Processes | Purpose: To study the basic principles and methods of modeling processes associated with chemical engineering in order to optimize and improve production processes. Contents: Introduction to the modeling of chemical engineering processes. Methods of mathematical modeling. Simulation of chemical reactions. Optimization of conditions for conducting chemical reactions. Modeling of heat and mass transfer processes. Heat transfer and mass transfer in chemical processes. Simulation of separation and purification processes. Optimization of separation processes. Modeling of management and control processes. Models of control and regulation of chemical processes. | 6 | | | v | | v | |
| | | | | Research Practice | Purpose: Studying the latest theoretical, methodological and technological achievements of domestic and foreign science, as well as consolidating practical skills, applying modern methods of scientific research, processing and | 10 | | | | v | | v |

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| | | | | | interpreting experimental data in a dissertation research.<br>Contents: The study of the latest achievements of domestic and foreign science. Drawing up a program and plan for research, setting and formulating tasks, objects of empirical research. Choice of research methodology, Conducting research. Generalization and preparation of the results of research activities. Preparation of arguments for scientific discussion. | | | | | | | |
| 3 | Module of Final Certification | | | Research work of a doctoral student, including passing an internship and completing a doctoral dissertation | Purpose: To prepare a doctoral student who owns the methodology of scientific knowledge of technological processes and is able to apply scientific methods in the study of problems of modern science, the final result of the research activity of which is writing and successful defense.<br>Contents: Organization of research work. Development of a scientific plan and schedule for the implementation of research work. Developing a methodology and conducting experiments, observations or surveys. Collection, processing and analysis of data, including the use of statistical methods. Writing scientific articles and publishing them in scientific journals. Participation in internships and scientific projects in other scientific institutions or universities. Preparation of a doctoral dissertation in accordance with the requirements of the scientific community. | 123 | | | | v | v | v |

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| | | | | Writing and Defending a Doctoral Thesis | Purpose: preparing doctoral students for independent research, writing a scientific dissertation and successfully defending it in front of the scientific community.<br>Contents: Definition of the research topic and setting the goals of the work. Literature review and analysis of existing scientific papers. Conducting experiments, researching data, or analyzing existing materials. Preparation of a dissertation in accordance with the requirements of the scientific community and the university. Detailed presentation and argumentation of the obtained results and their significance. Development of a presentation for the defense of a dissertation. Mastering the skills of public speaking and answering questions from the commission. Conducting a dissertation defense in front of the scientific community. | 12 | | | | v | v | |

## 5. SUMMARY TABLE ON THE VOLUME OF LOANS DISBURSED BY MODULES OF THE EDUCATIONAL PROGRAM

| Course of Study | Semester | The number of mastered modules | The number of studied disciplines | | Number of credits KZ | | | | | Total hours | Total credits KZ | The number of | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | UC | CC | Theoretical training | Pedagogical training | Research practice | DRW | Theoretical training | | | exams | Dif.of set |
| 1 | 1 | 2 | 3 | 2 | 25 | | | 5 | | 900 | 30 | 5 | 1 |
| | 2 | 2 | | | | 10 | | 20 | | 900 | 30 | | 2 |
| 2 | 3 | 2 | | | | | 10 | 20 | | 900 | 30 | | 2 |
| | 4 | 1 | | | | | | 30 | | 900 | 30 | | 1 |
| 3 | 5 | 1 | | | | | | 30 | | 900 | 30 | | 1 |
| | 6 | 1 | | | | | | 18 | 12 | 900 | 30 | | 2 |
| Total | | | 3 | 2 | 25 | 10 | 10 | 123 | 12 | 5400 | 180 | 6 | 9 |

## 6. LEARNING STRATEGIES AND METHODS, MONITORING AND EVALUATION

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| **Learning strategies** | **Student–centered learning:** The student is the center of teaching/learning and an active participant in the learning and decision-making process.<br>**Practice-oriented training:** orientation to the development of practical skills. |
| **Teachingmethods** | Conducting lectures, seminars, various types of practices:<br>• *using innovative technologies:*<br>• problem-based learning;<br>• case study;<br>• group work;<br>• discussions and dialogues, quizzes;<br>• presentations;<br>• lecture with analysis of specific situations;<br>• lecture-visualization;<br>• lecture-consultation;<br>• round table;<br>• situational analysis;<br>• analysis of production documentation;<br>• solving situational problems<br>• *rational and creative use of information sources:*<br>• multimedia training programs;<br>• electronic textbooks;<br>• digital resources.<br>Organization of independent work of students, individual consultations. |
| **Monitoring and evaluation of the achievability of learning outcomes** | **Current control** on each topic of the discipline, control of knowledge in classroom and extracurricular classes (according to syllabus). Assessment forms:<br>• survey in the classroom;<br>• testing on the topics of the discipline;<br>• control works;<br>• protection of independent work;<br>• discussions;<br>• colloquiums;<br>• essays, etc.<br>**Boundary control** at least twice during one academic period within the framework of one academic discipline.<br>Intermediate certification is carried out in accordance with the working curriculum, academic calendar.<br>**Forms of holding:**<br>• exam in the form of testing;<br>• oral examination;<br>• written exam;<br>• protection of practice reports;<br>• differentiated credit<br>**Final certification.** |

## 7. EDUCATIONAL AND RESOURCE SUPPORT OF THE EP

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| **Information Resource Center** | The structure of the Educational Information Center includes 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The basis of the network infrastructure of the Educational and Information Center is 180 computers with Internet access, 110 workstations, 6 interactive whiteboards, 2 video doubles, 1 video conferencing system, 3 A-4 format scanners, JIC software - AIBS "IRBIS-64" under MS Windows (basic set of 6 modules), stand-alone server for uninterrupted operation in the IRBIS system.<br>The library fund is reflected in the electronic catalog available to users on the site http://lib.ukgu.kz on-line 24 hours 7 days a week.<br>Thematic databases of their own generation: "Almamater", "Proceedings of SKSU scientists", "Electronic archive" have been created. Online access from any device 24/7 via the external link http://articles.ukgu.kz/ru/pps.<br>Catalogs are processed electronically. EC consists of 9 databases: "Books", "Articles", "Periodicals", "Proceedings of the teaching staff of SKSU", "Rare Books", "Electronic Fund", "SKGU in Print", "Readers" and "SKU".<br>The EIC provides its users with 3 options for accessing its own electronic information resources: from the “Electronic Catalog” terminals in the catalog hall and in the EIC subdivisions; through the information network of the university for faculties and departments; remotely on the library website http://lib.ukgu.kz/.<br>Open access to international and republican resources: "SpringerLink", "Polpred", "Web of Science", "EBSCO", "Epigraph", to electronic versions of scientific journals in the public domain, "Zan", "RMEB", "Adebiet", Digital library "Aknurpress", "Smart-kitar", "Kitar.kz", etc.<br>For people with special needs and disabilities, the library website has been adapted to the work of visually impaired users |
| **Material and technical base** | • Educational and research, scientific laboratory named after O.S.Balabekov;<br>• Educational and research, scientific Laboratory of mechanical tests named after A.Ainabekov.<br>**Specializedlaboratories:**<br>• Informationandcommunicationtechnologies;<br>• Engineeringcomputergraphics;<br>• Standardization, certificationandmetrology;<br>• Educational and Research Laboratory of cutting theory;<br>• Educational laboratory "Theory of machines and mechanisms";<br>• Materials Science Training Laboratory;<br>• Educational laboratory "Technology of mechanical engineering";<br>• Training laboratory "Machine parts";<br>• Educational laboratory "Materials Science and Foundry processes".<br>**UNPC base**<br>• SHF JSC "NGSK Kazstroyservice".<br>**Practicebases:**<br>• LLP « SOUTHS-OIL»<br>• LLP « KAZNIIHIMPROJECT»<br>• LLP « KazNIIPPP»<br>• SHF JSC "NGSK Kazstroyservice" and so on. |

**AGREEMENT SHEET**

according to the Educational program 8D07180 – «Technological machines and equipment (on branch)»

Director of IPE _____ Z. Konarbayeva
sign

Director of ASD _____ U. Nazarbek
sign

Director of DEK _____ T. Bazhirov
sign