



**SATBAYEV
UNIVERSITY**

**Mining and Metallurgical Institute named after O.A. Baikonurov
Department «Metallurgy and mineral processing»**

EDUCATIONAL PROGRAM

6B07218 – Technology of foundry production

Code and classification of the field of education:	6B07 - Engineering, manufacturing and construction industries
Code and classification of areas of study:	6B072 - Manufacturing and processing industries
Group of educational programs:	B069 - "Production of materials (glass,paper,plastic,wood)"
NQF level:	6
ORC level:	6
Training period:	4 years
Volume of loans:	240

Almaty 2025

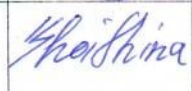
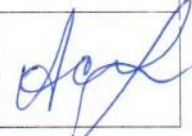
The educational program «6B07218 – Technology of foundry production»
was approved at the meeting of K.I. Satbayev KazNRTU Academic Council

Protocol № 4 dated « 12 » 12 2024 y.

was reviewed and recommended for approval at the meeting of K.I. Satbayev
KazNRTU Educational and Methodological Council

Protocol № 3 dated « 20 » 12 2024 y.

Educational program «6B07218 – Technology of foundry production» was
developed by Academic committee based on direction of «6B072 – Manufacturing
and processing industries»

Full name	Academic degree/ academic title	Position	Workplace	Signature
Chairperson of Academic Committee:				
Barmenshinova M.B.	c.t.s., associate professor	Head of the Department of MaMP	KazNRTU named after K.I.Satpaeva	
Teaching staff:				
Chepushtanova T.A.	PhD doctor c.t.s.	Professor of the Department of MaMP	KazNRTU named after K.I.Satpaeva	
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Employers:				
Ospanov E.A.	d.t.s.	Head of department of complex processing of technogenic materials	«Kazakhmys» Corporation LLP	
Students:				
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List of abbreviations and designations

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List of abbreviations and symbols

NJSC "Kazakh National Research Technical University named after K.I. Satpayev" - NJSC KazNRTU named after K.I. Satpayev;

SOSE - State obligatory standard of education of the Republic of Kazakhstan;

MSaHE RK - Ministry of Science and Higher Education of the Republic of Kazakhstan;

EP - educational program;

IWS - independent work of a student (student, undergraduate, doctoral student);

IWST - independent work of a student with a teacher (independent work of a student (undergraduate, doctoral student) with a teacher);

WC - working curriculum;

CED - catalog of elective disciplines;

UC - university component;

CC - component of choice;

NQF - National Qualifications Framework;

SQF - Sectoral Qualifications Framework;

LO - learning outcomes;

KC - key competencies.

SDG - Sustainable Development Goals

1. Description of the educational program

It is intended for the implementation of specialized bachelor's degree training in the educational program «6B07218 – Technology of foundry production» at Satbayev University and was developed within the framework of the direction «Manufacturing and processing industries».

This document meets the requirements of:

– Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2 "On approval of State mandatory standards of higher and postgraduate education". It was registered with the Ministry of Justice of the Republic of Kazakhstan on July 27, 2022, No. 28916.

– «National Qualifications Framework», approved by the Protocol dated 06.16.2016 of the Republican Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations; – Industry Qualifications Framework "Mining and Metallurgical Complex" dated 07.30.2019 No. 1.

Introduction to the educational program.

The educational program «6B07218 – Technology of foundry production» is the first level of qualification of a three-tier higher education system, which provides the basis for subsequent master's degree programs and then doctoral programs.

The program is aimed at training casting technologists. The necessary basic knowledge and skills in the field of engineering and technology will allow future specialists to easily integrate into the foundry industry workflow. The educational program provides scientific foundations in the field of materials science, foundry, heat treatment and surface hardening. Training of casting technologists for enterprises of Kazakhstan working in the field of foundry, metallurgy and mechanical engineering. The work of specialists consists in the creation, improvement, operation and repair of devices and devices, the creation and research of new materials, as well as their development and implementation of technologies by industry.

The educational program «6B07218 – Technology of foundry production» includes fundamental, natural science, general engineering and professional bachelor's degree training in foundry technology in accordance with the development of science and technology, as well as the changing needs of the mining and metallurgical industry. A distinctive feature of the program is that the program provides graduates with adaptability to the manufacturing sector, due to the content of 40% of general engineering disciplines in the educational program. The graduate receives a fundamental set of general engineering disciplines, as well as the maximum set of specialized disciplines. The program provides in-depth study of the following special disciplines: Technology of structural materials, Theory of mechanisms and machines, Resistance of materials, Physico-chemical fundamentals of foundry production, Quality assurance Tools, Physical Metal Science, Fundamentals of Machine design and parts, Theory of forming metal systems, Foundry alloys and melting, Core and molding mixtures, Methods of protection of metals and alloys corrosion protection, Resource protection- and

energy saving in foundry production, Design and equipment of foundries, Foundry technology, Mold manufacturing technology, Mobile hydraulics.

The field of professional activity of graduates who have completed the bachelor's degree program includes:

- processes for obtaining metals and alloys, metal products of the required quality;
- processing processes that change the chemical composition and structure of metals (alloys) to achieve certain properties;
- design and production of blanks;
- knowledge of CAE-system, CAD-system in foundry production;
- modeling of casting processes.

Graduates of the program will be able to carry out professional activities in the mining and metallurgical complex in engineering and working positions, in metallurgical enterprises, in design organizations, in metallurgical research centers.

Line personnel include: a foundry worker; a design engineer; a technologist; an engineering researcher in design organizations, institutions, institutes, universities; a teaching staff member; a technical specialist, a technical consultant in the fields of activity; a technical engineer, a process engineer in the field of materials science (materials scientist, metallologist); a research engineer; electronic engineering engineer, etc.

Types and objectives of the graduate's professional activity

The list of types of professional activity and their corresponding professional tasks:

Types of professional activity	Professional tasks
scientific research activities	- conducting experimental research; - carrying out literary and patent search, preparation of technical reports, information reviews, publications; - study of scientific and technical information, domestic and foreign experience on the subject of research;
design and analytical activities	- carrying out a technical and economic analysis of the development of projects for new and reconstruction of existing workshops, industrial units and equipment; - analysis of designs and calculations of technological equipment; - analysis of design and working technical documentation; - development and analysis of mathematical models;
production and technological activities	- implementation of technological processes for the production and processing of metals and alloys, as well as products made from them; - implementation of measures to protect the environment from man-made impacts of production;

	- implementation of measures to ensure product quality; - organization of workplaces, their technical equipment, placement of technological equipment; - monitoring compliance with technological discipline; - organization of maintenance of technological equipment;
design and technological activities	- collecting information for a feasibility study and participating in the development of projects for new and reconstruction of existing workshops, industrial units and equipment; - calculation and construction of technological equipment elements; - development of design and working technical documentation;

2. Purpose and objectives of the educational program

The purpose of EP «6B07218 – Technology of foundry production» is:

– fundamental and practical training of students to successfully solve engineering problems in various fields of foundry, metallurgy and materials science, which are interdisciplinary in nature, taking into account the principles of sustainable development and the introduction of environmentally sound technologies.

The objectives of the EP «6B07218 – Technology of foundry production» are:

- knowledge and understanding of the scientific and mathematical principles underlying various specializations in foundry technology;
- the ability to apply the acquired knowledge to formulate, formulate and solve applied scientific problems in foundry technology using recognized methods;
- the ability to apply the acquired knowledge to the analysis of technical systems, processes and methods related to various specializations in foundry technology, including using modeling methods.;
- understanding of engineering systems design methodologies and the ability to apply them;
- the ability to analyze, plan and conduct the necessary research, interpret the data obtained and draw conclusions;
- the ability to select and use appropriate equipment, tools, and techniques;
- work effectively both individually and as a team member;
- to show awareness in the field of project management and business, knowledge and understanding of the impact of risks and changing conditions;
- be aware of the need and have the ability to independently study and improve their skills throughout their lives;
- understanding of health, safety, legal aspects and responsibility for engineering activities, understanding the impact of engineering solutions on the social context and the environment;
- follow the code of professional ethics and standards of engineering practice;
- formation of students' environmental responsibility and understanding of the principles of circular economy aimed at reducing production waste and rational use of natural resources in accordance with the SDGs.

3. Requirements for evaluating the learning outcomes of an educational program

As a result of mastering the bachelor's degree program 6B07218 – "Technology of foundry production", the graduate should have general cultural, general professional and professional competencies.

A graduate who has completed a bachelor's degree program must have the following competencies:

general cultural competencies:

- the ability to use the basics of philosophical knowledge, analyze the main stages and patterns of historical development to realize the social significance of their activities;
- ability to communicate orally and in writing in Russian and a foreign language to solve problems of interpersonal and intercultural interaction;
- ability to work in a team, tolerantly perceiving social, ethnic, religious and cultural differences;
- ability to self-organize and self-education;
- ability to use general legal knowledge in various fields of activity;
- ability to maintain proper the level of physical fitness to ensure full-fledged social and professional activities.

general professional competencies:

- willingness to use fundamental general engineering knowledge;
- willingness to critically reflect on accumulated experience, to change the profile of their professional activities, if necessary;
- ability to realize the social significance of their future profession;
- willingness to combine theory and practice to solve engineering problems;
- the ability to apply the principles of rational use of natural resources and environmental protection in practice;
- the ability to use regulatory legal documents in their professional activities;
- the willingness to choose measuring instruments in accordance with the required accuracy and operating conditions;
- the ability to follow metrological standards and regulations, meet the requirements of national and international standards in the field of professional activity;
- the ability to use the principles of the quality management system.

professional competencies corresponding to the type(s) of professional activity that the bachelor's degree program is focused on:

scientific and research activities:

- the ability to analyze and synthesize;
- the ability to choose research methods, plan and conduct necessary experiments, interpret results and draw conclusions;
- the willingness to use the physical and mathematical apparatus to solve problems arising in the course of professional activity;

- the willingness to use the basic concepts, laws and models of thermodynamics, chemical kinetics, heat and mass transfer;
- the ability to select and apply appropriate methods for modeling physical, chemical and technological processes.

design and analytical activity:

- ability to perform technical and economic analysis of projects;
- ability to use a process approach;
- the ability to use information tools and technologies in solving problems that arise in the course of professional activity;
- the willingness to make calculations and draw conclusions when solving engineering problems.

production and technological activity:

- the ability to implement and adjust technological processes in metallurgy and material processing;
- willingness to identify facilities for improvement in engineering and technology;
- the ability to select materials for products for various purposes, taking into account operational requirements and environmental protection;
- the willingness to assess risks and determine measures to ensure the safety of technological processes.

design and technological activity:

- the ability to carry out project elements;
- the willingness to use standard software tools in design;
- the ability to justify the choice of equipment for technological processes.

additional competencies in the field of organizational and managerial activities, agreed with employers:

- the ability to apply methods of technical and economic analysis;
- willingness to use the principles of production management and personnel management;
- willingness to use the organizational and legal foundations of managerial and entrepreneurial activities;
- the ability to organize the work of a team to achieve a set goal.

additional general professional competencies focused on areas of knowledge: communication, individual and teamwork, lifelong education, additional engineering skills:

- the ability to acquire new, expand and deepen previously acquired knowledge, skills and competencies in various areas of life necessary for successful implementation in the field of professional activity, including at the junction of different fields of activity and fields of sciences.

Special requirements for graduation in this OP:

- The student should have a general understanding of the topic of the thesis/research plans, and contact potential academic supervisors one year before the expected completion of studies.;

- to get acquainted with potential scientific supervisors and accelerate students' choice of thesis topics (project), a review meeting is held one year before the expected completion of studies;
- to collect the necessary data and study current tasks, methods and procedures on the topic of the thesis, the student undergoes an internship;
- upon completion of the internship, the student contacts the supervisor in writing or verbally and reports on the results of the work, but no more than one week after the start of the 4th year of study;
- within 4 weeks after the start of studies, the student and the supervisor should discuss and decide on the type (research, project or independent study) and the topic of the thesis. This is an extremely important discussion and decision, as further changes in the topic and type of work are impossible.;
- the topic of the thesis (project) and the supervisor are assigned to the student or group of students no more than six weeks after the start of the final year of study and approved by the order of the rector of the higher educational institution.

Additionally, the ability of graduates to apply the principles of sustainable development in technological processes, including the rational use of resources, waste reduction and the introduction of environmentally sound production methods, is assessed, which is consistent with the SDGs.

4. Passport of the educational program

4.1. General information

№	Field name	Note
1	Code and classification of the field of education	6B07 - Engineering, manufacturing and construction industries
2	Code and classification of areas of study	6B072 - Manufacturing and processing industries
3	Group of educational programs	B069 - "Production of materials (glass,paper,plastic,wood)"
4	Name of the educational program	6B07218 – Technology of foundry production
5	Brief description of the educational program	The program is aimed at training casting technologists. The educational program provides scientific foundations in the field of materials science, foundry, heat treatment and surface hardening.
6	Purpose of the EP	Fundamental and practical training of students to successfully solve engineering problems in various fields of foundry, metallurgy and materials science, which are interdisciplinary in nature, taking into account the principles of sustainable development and the introduction of environmentally sound technologies
7	EP type	New
8	NQF level	6
9	OC level	6
10	Distinctive features of the EP	No
11	List of competencies of the educational program:	Professional competencies; Research competencies; Basic competencies and knowledge; Communication competencies; Universal competencies; Cognitive competencies; Creative competencies; Information and communication competencies.
12	Learning outcomes of the educational program:	LO1 - communicate successfully and at a high level in business circles in the state and other foreign languages; are able to use the physical and mathematical apparatus to solve problems arising in the course of professional activity; know traditions and culture, the basics of the legal system and legislation of the Republic of Kazakhstan; know the basics of the theory of fundamental sections of chemistry; are able to implement and adjust technological processes in metallurgy and enrichment. LO2 - use language skills in the professional sphere; use the basic laws of natural science disciplines in professional activity, apply methods of mathematical analysis and modeling, theoretical and experimental research. LO3 - have the skills to handle modern technology, are able to use information technology in the field of professional activity; possess the basic methods, methods and means of obtaining,

		storing, processing information; are able to apply in practice the principles of rational use of natural resources. LO4 - have basic knowledge in the field of natural sciences that contribute to the formation of a highly educated person with a broad outlook and culture; are able to combine theory and practice to solve engineering problems; are able to use basic concepts, laws and models of thermodynamics, chemical kinetics, heat and mass transfer. LO5 - applies knowledge of theoretical and experimental fundamentals in the field of professional activity, rational technology and design of technological equipment used in foundry production, relying on innovative casting methods, taking into account industrial and environmental safety, contributing to reducing negative environmental impacts and rational use of resources in accordance with the SDGs; LO6 - analyze and improve the operation of the main and auxiliary technological equipment, effectively select auxiliary materials used in the foundry, taking into account sustainable development, innovation and environmental protection; LO7 - apply thermodynamic and hydraulic laws to identify patterns occurring in the casting process and solve engineering problems specific to foundry production in order to improve educational processes, introduce innovative solutions, use resources efficiently, minimize environmental impacts, and strengthen partnerships in the field of sustainable development; LO8 - are able to identify objects for improvement in engineering and technology; are able to use standard software tools in design; are able to choose and apply appropriate methods of modeling physical, chemical and technological processes in the field of enrichment and metallurgy.
13	Form of study	full-time
14	Training period	4 years
15	Volume of loans	240
16	Languages of instruction	Kazakh, Russian, English
17	Awarded Academic Degree	Bachelor of Engineering and Technology in the educational program «6B07218 – Technology of foundry production»
18	Developer and author:	Barmenshinova M.B.

4.2. The relationship between the achievability of the formed learning outcomes according to the educational program and academic disciplines

№	Name of the discipline	Brief description of the discipline	Amount of credits	Formed learning outcomes (codes)								
				LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9
Cycle of general education disciplines												
Required component												
1	Foreign language	English is a discipline of the general education cycle. After determining the level (according to the results of diagnostic testing or IELTS results), students are divided into groups and disciplines. The name of the discipline corresponds to the level of English proficiency. During the transition from level to level, the prerequisites and post-prerequisites of disciplines are observed.	10									
2	Kazakh (Russian) language	Kazakh (Russian) language. The socio-political, socio-cultural spheres of communication and functional styles of the modern Kazakh (Russian) language are considered. The course highlights the specifics of the scientific style in order to develop and activate professional and communicative skills and abilities of students. The course allows students to practically master the basics of scientific style and develops the ability to perform structural and semantic analysis of the text.	10									
3	Physical Culture	The purpose of the discipline is to master the forms and methods of forming a healthy lifestyle within the framework of the vocational education system. Familiarization with the natural-scientific foundations of physical education, possession of modern health technologies, basic methods of independent physical education and sports. And also as part of the course, the student will master the rules of judging in all sports.	8									
4	Information and Communication Technologies (in English)	The task of studying the discipline is to acquire theoretical knowledge about information processes, about new information technologies, local and global computer networks, methods of information protection; to acquire skills in using text editors and tabular processors; to create databases and various categories of application programs.	5									
5	History of Kazakhstan	The purpose of the discipline is to provide objective historical knowledge about the main stages of the history of Kazakhstan from ancient times to the present day; to acquaint students with the problems of the formation and development of statehood and	5									

		historical and cultural processes; to promote the formation of humanistic values and patriotic feelings in the student; to teach the student to use the acquired historical knowledge in educational, professional and everyday life; to assess the role of Kazakhstan in world history.											
6	Philosophy	The purpose of the discipline is to teach students the theoretical foundations of philosophy as a way of cognition and spiritual development of the world; developing their interest in fundamental knowledge, stimulating the need for philosophical assessments of historical events and facts of reality, assimilating the idea of unity of the world historical and cultural process while recognizing the diversity of its skills of applying philosophical and general scientific methods in professional activity.	5										
7	Module of socio-political knowledge (sociology, political science)	The objectives of the disciplines are to provide students with explanations on the sociological analysis of society, about social communities and personality, factors and patterns of social development, forms of interaction, types and directions of social processes, forms of regulation of social behavior, as well as primary political knowledge that will serve as a theoretical basis for understanding socio-political processes, for the formation of political culture, the development of personal position and a clearer understanding of the measure of their responsibility; to help master the political-legal, moral-ethical and socio-cultural norms necessary for activities in the interests of society, the formation of personal responsibility and personal success.	3										
8	Module of socio-political knowledge (culturology, psychology)	The purpose of the disciplines is to study the real processes of cultural activity of people who create material and spiritual values, to identify the main trends and patterns of cultural development, the change of cultural epochs, methods and styles, their role in the formation of a person and the development of society, as well as to master psychological knowledge for the effective organization of interpersonal interaction, social adaptation in the field of their professional activities.	5										
Cycle of general education disciplines Selectable Component													
9	Fundamentals of anti-corruption culture and law	Purpose: to increase the public and individual legal awareness and legal culture of students, as well as the formation of a knowledge system and a civic position on combating corruption as an antisocial phenomenon. Contents: improvement of socio-economic relations of the Kazakh society, psychological features of corrupt behavior,	5			V							

		formation of an anti-corruption culture, legal responsibility for acts of corruption in various fields.											
10	Fundamentals of Economics and Entrepreneurship	Purpose: To develop basic knowledge of economic processes and skills in entrepreneurial activities. Content: The course aims to develop skills in analyzing economic concepts such as supply and demand, and market equilibrium. It includes the basics of creating and managing a business, developing business plans, risk assessment, and strategic decision-making.	5		V	V							
11	Fundamentals of scientific research methods	Purpose: The goal of studying the discipline is to develop students' research skills; to introduce students to scientific knowledge, their readiness and ability to conduct research. Objectives of studying the discipline: to contribute to the deepening and consolidation of existing theoretical knowledge by students; to develop practical skills in conducting scientific research, analyzing the results obtained and developing recommendations; to improve methodological skills in independent work with information sources and appropriate software and hardware.	5	V	V	V							
12	Ecology and life safety	Purpose: formation of ecological knowledge and consciousness, obtaining theoretical and practical knowledge on modern methods of rational use of natural resources and environmental protection. Contents: the study of the tasks of ecology as a science, the laws of the functioning of natural systems and aspects of environmental safety in working conditions, environmental monitoring and management in the field of its safety, ways to solve environmental problems; life safety in the technosphere, emergencies of a natural and man-made nature.	5					V				V	
13	Basics of Financial Literacy	Purpose: formation of financial literacy of students on the basis of building a direct link between the acquired knowledge and their practical application. Contents: using in practice all kinds of tools in the field of financial management, saving and increasing savings, competent budget planning, obtaining practical skills in calculating, paying taxes and correctly filling out tax reports, analyzing financial information, orienting in financial products to choose adequate investment strategies.	5		V	V							
Cycle of basic disciplines													
University component													
14	Mathematics I	Purpose: to introduce students to the fundamental concepts of linear algebra, analytical geometry and mathematical analysis. To form the ability to solve typical and applied problems of the discipline. Contents_ Elements of linear algebra, vector algebra and analytical		V				V	V				

		geometry. Introduction to the analysis. Differential calculus of a function of one variable. The study of functions using derivatives. Functions of several variables. Partial derivatives. The extremum of a function of two variables.											
15	Mathematics II	Purpose: To teach students integration methods. To teach you how to choose the right method for finding the primitive. To teach how to apply a certain integral to solve practical problems. Contents_ integral calculus of the function of one and two variables, series theory. Indefinite integrals, methods of their calculation. Certain integrals and applications of certain integrals. Improper integrals. Theory of numerical and functional series, Taylor and Maclaurin series, application of series to approximate calculations_		V				V	V				
16	Physics	Purpose: To form ideas about the modern physical picture of the world and scientific worldview, the ability to use knowledge of fundamental laws, theories of classical and modern physics. Contents_ physical fundamentals of mechanics, fundamentals of molecular physics and thermodynamics, electricity and magnetism, vibrations and waves, optics and fundamentals of quantum physics.		V					V				
17	Engineering and computer graphics	Purpose: To develop students' knowledge of drawing construction and skills in developing graphical and textual design documentation in accordance with standards. Content: Students will study ESKD standards, graphic primitives, geometric constructions, methods and properties of orthogonal projection, Monge's projection, axonometric projections, metric tasks, types and features of connections, creating part sketches and assembly drawings, detailing, and creating complex 3D solid objects in AutoCAD.	V	V	V								V
18	Chemistry	The aim of the course is to study the structure of the periodic system of elements and the main characteristics of elements and their compounds arising from it. The course is aimed at instilling the skills of conducting chemical experiments. The course covers the nomenclature of chemical compounds, basic chemical laws and concepts, methods for studying the physico-chemical properties of substances and the main classes of inorganic compounds, as well as their application in solving professional problems.	5		V								
19	Physical chemistry	Purpose: to form students' abilities to understand the physico-chemical essence of processes and to use the basic laws of physical chemistry in complex industrial and technological activities. Contents: laws of thermodynamics; basic equations of chemical thermodynamics; methods of thermodynamic description of chemical and phase equilibria in multicomponent systems;	5		V					V			

		properties of solutions; fundamentals of electrochemistry; basic concepts, theories and laws of chemical kinetics and catalysis.										
20	Technology of structural materials	The purpose of the discipline is to formulate bachelor students' competencies in the field of functional interrelation of material and structure, which determines the choice and optimization of material properties, based on the purpose of durability and operating conditions of structures; the study of compositions, structures and technological bases for obtaining metal materials with specified functional properties, instrumental methods of material quality control The content of the discipline: Classification and properties of structural materials. Fundamentals of metallurgical production. Technologies of foundry production. Fundamentals of metalworking technology by pressure. Powder metallurgy. Technologies of material processing by cutting. Instrumental materials. Electrophysical, electrochemical and special methods of material processing. Welding and soldering technologies for metals and alloys. Composite materials and methods of their processing.	4					V	V	V		
21	The theory of mechanisms and machines	The purpose of studying the discipline is to form the scientific foundations of students' knowledge of general methods of research and design of mechanisms of machines and devices, to prepare a scientific and theoretical basis for the development of special disciplines and the basics of modern technology Contents: Introduction. The basic concepts of the theory of mechanisms and machines. The main types of mechanisms. Structural analysis and synthesis of mechanisms. Synthesis of mechanisms with lower pairs. Kinematic analysis of mechanisms. Dynamics. Basic concepts. Kinetostatic (force) analysis of mechanisms. Dynamic analysis of mechanisms. Introduction to the theory of the highest kinematic pair. Mechanisms with higher kinematic pairs. Analysis and synthesis of gear mechanisms. Analysis and synthesis of cam mechanisms. Vibrations and vibrations in machines and mechanisms	5					V	V	V		
22	Strength of materials	To independently calculate structural elements, mechanisms and machine parts. Contents_ Stretching and compression. Stresses in cross sections and deformations of a straight rod. Mechanical properties of materials under tension and compression. Calculation of tensile and compressive strength and stiffness. Geometric characteristics of flat sections. Shear and torsion. Calculation of strength and torsional stiffness. The bend. Normal and tangential	5	V					V			

		bending stresses_										
23	Physico-chemical fundamentals of foundry production	The purpose of the discipline: to study the theoretical foundations, as well as the main processes of foundry production of ferrous and non-ferrous metals, including equipment, tools and technology necessary for the implementation of these processes. The content of the discipline: acquisition of basic knowledge of the theoretical processes of forming cast blanks used to solve engineering problems of obtaining castings with specified service and technological properties; study of the main technological processes of foundry production of ferrous and non-ferrous metals; study of equipment, tools and technology necessary for the implementation of foundry processes.	5		V					V		
24	Quality assurance tools	The purpose of the discipline is to provide students with basic scientific and practical knowledge in the field of metrology, standardization and certification necessary to solve the problems of ensuring the uniformity of measurements and quality control of products (services); metrological and regulatory support for production, testing, operation and disposal of products; planning and execution of work on standardization and certification of products; metrological and regulatory expertise production activities. The content of the discipline: Theoretical foundations of metrology. Basic concepts related to measurement objects. Accuracy of measurement methods and results. The measurement system. Metrological support. State control and supervision in the field of standardization. Theoretical foundations of certification. Organizational and methodological foundations of certification in the Republic of Kazakhstan.	5				V	V	V			
25	Physical metal science	The purpose of the discipline: the formation of students' knowledge in the field of properties of structural materials used in technological processes and industries, as well as the ability and willingness to assess the levels of threats and risks associated with their use. The content of the discipline: familiarization of students with the structure of materials, their mechanical, physico-chemical, operational and technological properties, classification of structural materials and alloys of ferrous and non-ferrous metals; study of technological methods, changes in the structure and properties of materials in a given direction; features of non-metallic materials - plastics, ceramics, composite materials and sealing materials used together with them materials; familiarization with the basics of the theory and technology of thermal and chemical-thermal treatment of	5	V			V	V				

		steels and alloys										
26	Bases of designing and details of cars	Purpose: to acquire knowledge of calculations and design of machine parts and assemblies, taking into account the criteria of strength, reliability and stability. Contents_ general principles of design and construction, construction of models and calculation algorithms for standard machine parts taking into account performance criteria, fundamentals of theory and methodology for calculating standard machine parts, computer technologies for designing assemblies and machine parts. Basic requirements for machine parts and assemblies_	5				V	V	V			
27	Theory of formation of metal systems	The purpose of the discipline is to study the formation of metal systems, the structure of cast products, the physical essence of the processes occurring in the casting material and in the mold during solidification and cooling of the casting in and out of shape and their management techniques Content of the discipline: the essence of casting as a method of metalworking, its place and role in modern industrial production; processes of melt flow and mold filling; Formation of the crystal structure of cast products; processes of solidification and cooling of cast products; metal shrinkage processes during solidification of cast products; gas processes during the formation of cast products; shrinkage processes of cast products during cooling in solid state	5						V	V		
28	Foundry alloys and smelting	The purpose of the discipline is for students to acquire knowledge about the properties of foundry alloys, the theoretical foundations of their crystallization and melting, as well as practical skills to determine the technological (foundry) properties of the most common foundry alloys for the manufacture of machine-building products. The content of the discipline: Fluidity of metals and alloys. Gas absorption and gas release in metals and alloys. Liquation properties of alloys are the basic concepts of shrinkage. Iron-carbon casting alloys. General characteristics of the structure and properties of cast iron. Foundry alloys of non-ferrous metals. Thermodynamics of the processes of phase interaction during melting. Kinetics of metallurgical processes in the melting of foundry alloys.	5					V	V	V		
29	Core and molding mixtures	The purpose of the discipline is for students to acquire knowledge about molding materials, molding and core mixtures, auxiliary compositions; to acquire skills in determining the properties of molding materials, molding and core mixtures, selecting the necessary compositions of molding mixtures for various casting	5						V	V		

		processes Content of the discipline: initial molding materials: fillers, binders, special additives; molding quartz sands, non-quartz fillers; inorganic binders: molding clays, liquid glass, crystal hydrate binders; organic binders: oil binders, lignosulfonates, synthetic resins; properties, curing mechanisms; binder compositions based on liquid glass and synthetic resins; typical compositions and properties of molding and core mixtures.										
30	Methods of protection of metals and alloys from corrosion	The purpose of the discipline is to teach how to use knowledge of the basic patterns of chemical and electrochemical corrosion to predict the possible nature and type of destruction of ferrous and non-ferrous metals and alloys under the action of aggressive media. The content of the discipline: Corrosion and protection of metals in gaseous media. The mechanism of chemical corrosion and the theory of gas corrosion. Classification, properties and growth laws of oxide films. The kinetics of corrosion. The theory of high-temperature alloying. Electrochemical mechanism of corrosion. Electrochemical and diffusion kinetics. The influence of external and internal factors. Contact corrosion of metals. Types of corrosion effects on metal. Corrosion-resistant casting alloys. Protective coatings. Electrochemical corrosion protection. Principles of corrosion-resistant alloying.	4	V				V				
31	Resource and energy saving in foundry production	The purpose of the discipline is to study the processes and devices that ensure energy and resource conservation and environmental protection in the implementation of technological operations and the effective organization of foundry production of products of the required quality from ferrous and non-ferrous metal alloys. The content of the discipline: technological schemes of foundries and consumers of their energy resources; methods of compiling energy balances and rationing energy costs; methods of reducing energy costs and the choice of resource- and energy-saving technologies for melting metals.	5	V				V				
The cycle of basic disciplines Component of choice												
32	The theoretical mechanics	The purpose of the discipline is to form the foundations of engineering thinking among students by studying the basics of mechanics and mastering the basic principles and laws of theoretical mechanics The content of the discipline: the basic laws of mechanical motion and mechanical interaction of material bodies; the basic concepts of the law of mechanics, methods for studying	5		V			V		V		

		the equilibria of motion of a material point, a solid and a mechanical system											
33	Fundamentals of sustainable development and ESG projects in Kazakhstan	Purpose: the goal is for students to master the theoretical foundations and practical skills in the field of sustainable development and ESG, as well as to develop an understanding of the role of these aspects in the modern economic and social development of Kazakhstan. Contents: introduces the principles of sustainable development and the implementation of ESG practices in Kazakhstan, includes the study of national and international standards, analysis of successful ESG projects and strategies for their implementation in enterprises and organizations.	5				V	V					
34	ESG principles in inclusive culture	Purpose of the course: It focuses on studying ESG (Environmental, Social, Governance) principles and their interaction with the creation of an inclusive culture within an organization. Content: Students will gain knowledge on how implementing ESG principles contributes to corporate social responsibility, sustainable development, and equal opportunities for all employees, including those who may face various forms of discrimination. The course will help students understand the importance of an inclusive culture in achieving long-term business goals and ensuring sustainable organizational development.	5			V	V				V		
35	Design and production of blanks	The purpose of the discipline: is the theoretical and practical training of students in the basic methods of designing and obtaining blanks, as well as ways to ensure the manufacturability and competitiveness of products in the foundry The content of the discipline: the study and acquisition of skills in designing and obtaining blanks from metal, combined and non-metallic materials; analysis of current trends in the design of technological processes, tools and devices; basic methods for ensuring the manufacturability of blanks and products in foundry production	5			V	V				V		
36	Quality control of castings	The purpose of the discipline: to study the technological foundations of ensuring the quality of castings, the theoretical foundations of the qualimetric assessment of castings and technological processes of foundry production The content of the discipline: the main types and features of control and measuring equipment in modern foundry production; types of defects in cast products, ways to identify and prevent them; basic provisions and technological methods of quality assurance and qualimetric assessment of castings and technological processes of their manufacture	5				V	V	V				
37	Legal regulation of intellectual property	Purpose: the goal is to form a holistic understanding of the system	5	V		V	V						

		of legal regulation of intellectual property, including basic principles, mechanisms for protecting intellectual property rights and features of their implementation. Content: The discipline covers the basics of IP law, including copyright, patents, trademarks, and industrial designs. Students learn how to protect and manage intellectual property rights, and consider legal disputes and methods for resolving them.										
38	Theory of casting processes	The purpose of the discipline is for students to acquire theoretical knowledge about the formation of high-quality castings, which occurs during the thermal, force and chemical interaction of the casting and the mold. The content of the discipline: the processes of forming castings and ways to control them; scientific justification for the selection and calculation of technological parameters that ensure the production of castings of a given quality; physical processes occurring in liquid and solid metals during their flow, solidification, cooling and crystallization	5					V		V	V	
39	Theory of casting formation	The purpose of the discipline is for students to acquire basic knowledge about the phenomena and processes that take place in the production of castings from various metals of alloys from the moment of preparation of the liquid melt to cooling of the solid workpiece. The content of the discipline: A brief description of the main stages of foundry production. The problems of foundry production at the present stage (technical, technological, economic, environmental and social) and possible ways to solve them. Classification of foundry alloys and metals according to their main parameters. Features of processing of the main machine-building alloys. Features of the transition of metals and alloys to a liquid state. Theoretical foundations of the melting process.	5					V		V	V	
40	Fundamentals of Artificial Intelligence	Purpose: to familiarize students with the basic concepts, methods and technologies in the field of artificial intelligence: machine learning, computer vision, natural language processing, etc. Contents: general definition of artificial intelligence, intelligent agents, information retrieval and state space exploration, logical agents, architecture of artificial intelligence systems, expert systems, observational learning, statistical learning methods, probabilistic processing of linguistic information, semantic models, natural language processing systems.	5		V	V						
41	Economics and management in foundry production	The purpose of the discipline: the formation of students' knowledge system of science and technology sections containing a set of tools, techniques, methods and methods of human activity aimed at	6				V		V		V	

		creating competitive foundry products The content of the discipline: non-current and current assets of the enterprise, personnel of the enterprise and remuneration, production capacity and production program of the enterprise, cost of production, fundamentals of pricing, tax system, income and profit of the enterprise, innovation, efficiency of production activities of the foundry enterprise											
42	Entrepreneurial activity in the foundry	The purpose of the discipline: the formation of students' skills in determining the organizational and legal form of entrepreneurial activity, developing a business plan and choosing a strategy for entrepreneurial activity in a risk environment The content of the discipline: the concept and essence of entrepreneurial activity; objects, subjects and goals of entrepreneurship; regulatory framework governing entrepreneurial activity; types of entrepreneurship, organizational and legal forms of organizations; internal and external environment of entrepreneurial activity; characteristics and significance of stages of entrepreneurial activity; types of entrepreneurial decisions and economic methods of making them; entrepreneurial risks and ways to reduce them; the concept of an entrepreneurial culture	6						V	V	V		
Cycle of major disciplines													
University component													
43	Design and equipment of foundries	The purpose of the discipline: the study of working processes, design, operation features, the basics of calculating the structural and technological parameters of the main and auxiliary technological equipment of foundries. The content of the discipline: the study of equipment for the preparation of molding materials, molding and core mixtures, their regeneration and dosing; the study of the main methods of compaction of molding mixtures and design features of technological equipment for the manufacture of molds and rods; the study of technological equipment for melting and casting departments; the study of technological equipment for punching, cleaning castings, dust removal and waste transportation; the study of technological equipment for special casting methods.	4					V	V			V	
44	Technology of foundry production	The purpose of the discipline is to study modern technological solutions in the production of castings of ferrous and non-ferrous metals and alloys by various casting methods with minimal labor and material costs with high quality. Content of the discipline: Basic concepts of technological processes for the production of castings in single-use detachable molds from	5						V	V	V		

		sand-based mixtures. Design of the technological process of manufacturing castings. Principles of casting design. A typical technological process. The basic principles of choosing the position of the casting in the mold during molding, pouring, solidification. Production of molds and rods. Hardening of molds and rods. Assembly, casting, cooling of castings. Ways to correct defects in castings.										
45	Technology of casting molds manufacturing	The purpose of the discipline: students acquire theoretical knowledge on the physical processes of forming castings and manufacturing molds and the basic principles of calculation and design of mold elements Content of the discipline: manufacture of molds and rods; methods of mold manufacturing; technologically necessary degree of sealing; sealing by shaking, pressing, vibropressing; sandblasting, sandblasting and sandblasting compaction of mixtures; sealing curves; gravitational, pulse, vacuum sealing; methods of extracting models; manufacture of molds for large castings; manufacture of molds in serial and mass production	5						V	V		
46	Mobile hydraulics	The purpose of the discipline: the acquisition by students of knowledge in the field of hydraulic drives of mobile machines and qualifications that allow them to read and draw up diagrams, carry out installation, commissioning of hydraulic systems of mobile machines The content of the discipline: the main provisions of statics and dynamics of metal melts; methods of theoretical calculations of hydraulic systems using modern applied techniques; classification of modes of movement of molten metal, their influence on the nature and conditions of metallurgical overflows; minimization of hydraulic losses and optimization of conditions of flow of liquid melt; physical and technical bases of calculation of hydraulic systems	6		V			V				
Cycle of major disciplines Selectable Component												
47	CAE systems in foundry production	The purpose of the discipline: students' mastering of modern systems of engineering analysis in foundry production Discipline content: basic concepts of CAE systems, means of their provision; CAE in conditions of single, small-scale production; CAE in conditions of medium-scale production; CAE in conditions of large-scale and mass production; directions for improving CAE systems; mathematical modeling in CAE systems; the use of CAE systems in	5		V		V					

		the design of castings; the possibilities of modern CAE systems for automated calculation of 3D models of castings											
48	CAD systems in foundry production	The purpose of the discipline: students' mastering of modern systems of engineering analysis in foundry production Discipline content: principles of geometric modeling; types of CAD systems; frame modeling systems; surface modeling systems; solid-state modeling systems; non-linear modeling systems; modeling functions (primitives, Boolean operations, object-oriented programming, parametric modeling); CAD design of casting manufacturing technology and its economic efficiency; features of work in CAD-the system for the design and engineering calculations of castings	5			V		V					
49	Production of castings from non-ferrous metals and alloys	The purpose of the discipline is to form knowledge about the technological foundations of the production of castings and ingots from non-ferrous metals and alloys, about the structure and properties of non-ferrous casting. Content of the discipline: basic methods and features of melting non-ferrous metal alloys; technological methods and techniques for obtaining high-quality castings from non-ferrous alloys for various industries with specified properties; casting from aluminum alloys; casting from copper alloys; casting from zinc, magnesium, titanium, refractory metals; melting of non-ferrous metal alloys	4	V						V	V		
50	Metallurgical alloys of foundry production	The purpose of the discipline: the formation of knowledge about the patterns of crystallization and structure formation of metals and alloys, the basics of their heat treatment and melting Content of the discipline: basic casting properties of alloys; classification of casting alloys; methods for determining the casting properties of alloys; physico-chemical foundations of the casting alloy preparation process; basic technological parameters of melting, ensuring the production of high-quality castings from various grades of alloys, depending on the chosen method of their manufacture; technological methods of melting the most common iron-carbon and non-ferrous alloys; thermodynamics of processes phase interactions during melting; kinetics of metallurgical processes during melting of foundry alloys	4						V	V	V		
51	Production of castings from steel and cast iron	The purpose of the discipline: the formation of knowledge about the structure, technological and service properties, the main technological processes for the manufacture of castings from cast iron and steel, necessary to justify the choice of the casting method, the development and management of the implementation of these	6	V						V	V		

		processes in production conditions; the organization and control of technological processes. The content of the discipline: the study of the processes taking place in the casting mold in interaction with cast iron and steel; the study of the properties of steel and cast iron and their smelting processes; the study of methods for calculating the charge during the smelting of cast iron in various smelting units; the study of the casting properties of cast iron and steel and the influence of various elements on their mechanical properties; the study of defects in castings and measures for their elimination.										
52	Production of castings from composite materials	The purpose of the discipline: the formation of a system of knowledge, skills and abilities in the field of foundry production, using new composite materials The content of the discipline: structure and properties of non-metallic materials (plastics, wood materials, glass, ceramics), areas of their application; new structural materials, their properties, structure formation (synergetics), areas of application; promising technologies for obtaining castings from composite materials; familiarization with traditional and modern technologies for the production of castings from composite materials; development of technical means and the main methods of processing castings from composite materials	6	V						V	V	
53	Foundry metallurgy	The purpose of the discipline: formation of knowledge about the nature and properties of metals and alloys, as well as about methods of their hardening for the most effective use in engineering; familiarization with possible defects in metal products and mastering the theory and technology of heat treatment of metals Content of the discipline: history of foundry production; technical capabilities of various casting methods; classification of metals by density and melting point; the concept of alloy, alloy components; alloys based on ferrous and non-ferrous metals; requirements for foundry alloys; fluidity of metals and alloys; tendency to shrinkage; tendency to liquation; tendency to crack and gas defects; the influence of various factors on the casting properties of metals and alloys; methods for determining casting properties.	5	V				V				
54	Planning an industrial experiment	The purpose of the discipline: the formation of a professional culture of the researcher, the consolidation of knowledge and skills in the construction of experimental plans, processing and interpretation of experimental results The content of the discipline: modern methods of process research, passive and active experiment; basic principles of constructing experimental plans: classical, multifactorial optimal; methods of processing experimental data	5		V		V	V				

		through the use of applied programs, automated plotting; methods of constructing mathematical models of the experiment											
55	Automation of production processes in the foundry	The purpose of the discipline: to master the principles and develop skills for managing technological processes of foundry production and metallurgical units based on the use of information technologies and the construction of information management systems Content of the discipline: purpose, structure, main functions of automated control systems in relation to the peculiarities of metallurgical production; automated drive of foundry machines and automatic machines; automatic process control systems; information support and principles of construction of automated process control systems of foundry production	5		V		V						
56	Computer-aided design systems	The purpose of the discipline: the formation of theoretical knowledge and mastery of methods and tools for computer-aided design of automation systems The content of the discipline: fundamentals, classification, principles, tasks and structure of computer-aided design (CAD) systems; types of CAD software; prospects for the development and integration of CAD tools; CAD in foundry production; development and optimization of algorithms and modern digital computer-aided design systems of technological processes, the study of programs for the manufacture of castings of various complexity on machines with numerical control	5		V		V						
57	Modeling of foundry processes	The purpose of the discipline is to form knowledge about the basics of methodology and tools of system analysis, as well as modeling methods that can be applied in the field of foundry production. The content of the discipline: the basic laws of functioning and methods of management of systems, including in conditions of uncertainty; the main provisions and concepts of system analysis in relation to foundry production; the main provisions of the analysis of management systems and processes, the organization of examinations of complex systems, analysis of information resources and product quality in the field of foundry production; types of mathematical models, their classification, methods for evaluating simulation results	5		V		V						
58	Fundamentals of metallurgical process modeling	The purpose of the discipline: the formation of students' competencies in the application of system analysis and mathematical modeling to optimize technological processes, expand understanding of the principles of functioning of metallurgical systems The content of the discipline: the concept of models and modeling, systems and their characteristics in the context of	5		V		V						

		technological processes, with special attention to metallurgical systems; theory and similarity criteria for process modeling; identification methods; methods for developing information databases; visualization and animation of models; principles of building econometric models, including multiple regression models and time series; methods of analysis and interpretation of the obtained models, methods of forecasting the development of technological processes										
59	Technology of special types of casting	The purpose of the discipline: to teach students the theory and practice of production of castings by special types of casting The content of the discipline: physico-chemical foundations of special casting methods; technological processes of manufacturing castings and their development trends; the role and place of special types of casting in the structure of foundry production; special types of casting and their scope; theoretical foundations of special casting methods; equipment of special casting methods and features of technological processes; casting using external influences for liquid and crystallizing metal; casting methods based on continuous casting forming processes; the stages of designing the technology of manufacturing castings by special casting methods	4						V	V	V	
60	Advanced technologies in foundry production	The purpose of the discipline: in-depth study of the main directions and principles of the development of technology and technology of foundry production based on scientific and technical achievements. Content of the discipline: general information about advanced technologies in foundry production; modern technologies for melting and pouring foundry alloys; modern technologies for induction, vacuum, electric arc and plate melting; modern technologies for out-of-furnace processing and casting of alloys; modern technologies for shaping using sand-clay and chemically hardening mixtures; modern technologies for cooking processes molding and core mixtures	4					V	V	V		
61	Methodology of scientific research in foundry production	The purpose of the discipline: the formation of skills for independent organization and conducting research in the field of foundry production. The content of the discipline: setting the research task and studying the state of the problem; critical analysis and systematization of information on the subject of ongoing research in the field of foundry production; methods of theoretical and empirical research; scientific research on the dynamics, strength of machines, devices and equipment in foundry production	5					V			V	V
62	Theory and practice of structural	The purpose of the discipline: the acquisition of general professional	5	V				V				V

	heredity	and professional competencies related to the formation of theoretical and practical knowledge in the field of metallurgy and foundry, or rather the structural heredity of raw materials and blanks The content of the discipline: the history of the development of the problem of heredity in nature and metal alloys; physico-chemical foundations of the phenomenon of structural heredity in alloys; special methods of processing metals and alloys; technological conditions of inheritance in the metalworking system (genesis of metals)											
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5 Curriculum of the educational program

NON-PROFIT JOINT STOCK COMPANY
“KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY NAMED AFTER K.I. SATBAYEV”



«APPROVED»
Decision of the Academic Council
NPJS «KazNRTU
named after K.Satbayev»
dated 06.03.2025 Minutes № 10

WORKING CURRICULUM

Academic year

2025-2026 (Autumn, Spring)

Group of educational programs

B069 - "Production of materials (glass, paper, plastic, tree)"

Educational program

6B07218 - "Technology of foundry production"

The awarded academic degree

Bachelor of engineering and technology

Form and duration of study

full time - 4 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	lek/lab/pr Contact hours	in hours SIS (including TSIS)	Form of control	Allocation of face-to-face training based on courses and semesters								Prerequisites	
									1 course		2 course		3 course		4 course			
									1 sem	2 sem	3 sem	4 sem	5 sem	6 sem	7 sem	8 sem		
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)																		
M-1. Module of language training																		
LNG108	Foreign language		GED, RC	5	150	0/0/45	105	E	5									
LNG104	Kazakh (russian) language		GED, RC	5	150	0/0/45	105	E	5									
LNG108	Foreign language		GED, RC	5	150	0/0/45	105	E		5								
LNG104	Kazakh (russian) language		GED, RC	5	150	0/0/45	105	E		5								
M-2. Module of physical training																		
KFK101	Physical culture I		GED, RC	2	60	0/0/30	30	E	2									
KFK102	Physical culture II		GED, RC	2	60	0/0/30	30	E		2								
KFK103	Physical culture III		GED, RC	2	60	0/0/30	30	E			2							
KFK104	Physical culture IV		GED, RC	2	60	0/0/30	30	E				2						
M-3. Module of information technology																		
CSE677	Information and communication technology		GED, RC	5	150	30/15/0	105	E			5							
M-4. Module of socio-cultural development																		
HUM137	History of Kazakhstan		GED, RC	5	150	15/0/30	105	GE		5								
HUM134	Module of socio-political knowledge (cultural studies, psychology)		GED, RC	5	150	30/0/15	105	E			5							
HUM132	Philosophy		GED, RC	5	150	15/0/30	105	E				5						
HUM120	Module of socio-political knowledge (sociology, political science)		GED, RC	3	90	15/0/15	60	E				3						
M-5. Module of anti-corruption culture, ecology and life safety base																		
CHE656	Ecology and life safety	1	GED, CCH	5	150	30/0/15	105	E				5						
MNG489	Fundamentals of economics and entrepreneurship	1	GED, CCH	5	150	30/0/15	105	E				5						
PET519	Fundamentals of scientific research methods	1	GED, CCH	5	150	30/0/15	105	E				5						
HUM136	Fundamentals of anti-corruption culture and law	1	GED, CCH	5	150	30/0/15	105	E				5						
MNG564	Basics of Financial Literacy	1	GED, CCH	5	150	30/0/15	105	E				5						
CYCLE OF BASIC DISCIPLINES (BD)																		
M-6. Module of physical and mathematical training																		
MAT101	Mathematics I		BD, UC	5	150	15/0/30	105	E	5									
PHY468	Physics		BD, UC	5	150	15/15/15	105	E	5									

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MAT102	Mathematics II		BD, UC	5	150	15/0/30	105	E		5							MAT101
M-8. Basic training module in metallurgy																	
MET805	Technology of structural materials		BD, UC	4	120	30/0/15	75	E		4							
GEN147	The theory of mechanisms and machines		BD, UC	5	150	15/15/15	105	E		5							
GEN408	Strength of materials		BD, UC	5	150	15/15/15	105	E		5							
MET806	Physico-chemical fundamentals of foundry production		BD, UC	5	150	30/15/0	105	E		5							
MET832	Quality assurance tools		BD, UC	5	150	30/0/15	105	E			5						
MET149	Physical metal science		BD, UC	5	150	30/0/15	105	E				5					CHE127, PHY111
GEN125	Bases of designing and details of cars		BD, UC	5	150	15/15/15	105	E				5					
MET807	Theory of formation of metal systems		BD, UC	5	150	30/0/15	105	E				5					
MET808	Foundry alloys and smelting		BD, UC	5	150	30/15/0	105	E				5					
MET809	Core and molding mixtures		BD, UC	5	150	30/15/0	105	E				5					
MET810	Methods of protection of metals and alloys from corrosion		BD, UC	4	120	30/0/15	75	E				4					
MET811	Resource and energy saving in foundry production		BD, UC	5	150	30/0/15	105	E					5				
M-7. Module of basic training																	
GEN429	Engineering and computer graphics		BD, UC	5	150	15/0/30	105	E	5								
CHE494	Chemistry		BD, UC	5	150	15/15/15	105	E		5							
AAP167	Practical Training		BD, UC	1				R		1							
GEN412	The theoretical mechanics	1	BD, CCH	5	150	30/0/15	105	E		5							
MNG563	Fundamentals of sustainable development and ESG projects in Kazakhstan	1	BD, CCH	5	150	30/0/15	105	E		5							
CHE950	ESG principles in inclusive culture	1	BD, CCH	5	150	30/0/15	105	E		5							
CHE127	Physical chemistry		BD, UC	5	150	15/15/15	105	E			5						
MET800	Design and production of blanks	1	BD, CCH	5	150	30/0/15	105	E					5				
MET801	Quality control of castings	1	BD, CCH	5	150	30/0/15	105	E					5				
MNG562	Legal regulation of intellectual property	1	BD, CCH	5	150	30/0/15	105	E					5				
MET699	Theory of casting processes	2	BD, CCH	5	150	30/0/15	105	E					5				
MET802	Theory of casting formation	2	BD, CCH	5	150	30/0/15	105	E					5				
CSE831	Fundamentals of Artificial Intelligence	2	BD, CCH	5	150	15/0/30	105	E					5				
MET803	Economics and management in foundry production	1	BD, CCH	6	180	30/0/30	120	E						6			
MET804	Entrepreneurial activity in the foundry	1	BD, CCH	6	180	30/0/30	120	E							6		
CYCLE OF PROFILE DISCIPLINES (PD)																	
M-9. Module of professional activity in metallurgy																	
MET812	Design and equipment of foundries		PD, UC	4	120	30/0/15	75	E						4			
MET813	Technology of foundry production		PD, UC	5	150	30/15/0	105	E							5		
MET814	Technology of casting molds manufacturing		PD, UC	5	150	30/15/0	105	E							5		
MET815	Mobile hydraulics		PD, UC	6	180	30/0/30	120	E							6		
M-10. Professional activity module																	
AAP109	Industrial internship I		PD, UC	4				R				4					
AAP183	Production practice II		PD, UC	3				R						3			
MET830	CAE systems in foundry production	1	PD, CCH	5	150	30/15/0	105	E						5			
MET831	CAD systems in foundry production	1	PD, CCH	5	150	30/15/0	105	E						5			
MET816	Production of castings from non-ferrous metals and alloys	2	PD, CCH	4	120	30/0/15	75	E						4			
MET819	Metallurgical alloys of foundry production	2	PD, CCH	4	120	30/0/15	75	E						4			
MET817	Production of castings from steel and cast iron	1	PD, CCH	6	180	30/15/15	120	E							6		
MET818	Production of castings from composite materials	1	PD, CCH	6	180	30/15/15	120	E							6		
MET820	Foundry metallurgy	2	PD, CCH	5	150	30/15/0	105	E							5		

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MET821	Planning an industrial experiment	2	PD, CCH	5	150	30/0/15	105	E								5	
MET822	Automation of production processes in the foundry	1	PD, CCH	5	150	30/0/15	105	E								5	
MET823	Computer-aided design systems	1	PD, CCH	5	150	30/0/15	105	E								5	
MET824	Modeling of foundry processes	2	PD, CCH	5	150	30/15/0	105	E								5	
MET825	Fundamentals of metallurgical process modeling	2	PD, CCH	5	150	30/0/15	105	E								5	
MET826	Technology of special types of casting	3	PD, CCH	4	120	30/0/15	75	E								4	
MET827	Advanced technologies in foundry production	3	PD, CCH	4	120	30/15/0	75	E								4	
M-11. Module of "R&D"																	
MET828	Methodology of scientific research in foundry production	1	PD, CCH	5	150	30/0/15	105	E								5	
MET829	Theory and practice of structural heredity	1	PD, CCH	5	150	30/0/15	105	E								5	
M-12. Module of final attestation																	
ECA 103	Final examination		FA	8												8	
Additional type of training (ATT)																	
AAP500	Military training																
Total based on UNIVERSITY:									27	33	31	29	29	31	33	27	
									60		60		60		60		

Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			
		Required component (RC)	University component (UC)	Component of choice (CCH)	Total
GED	Cycle of general education disciplines	51	0	5	56
BD	Cycle of basic disciplines	0	89	21	110
PD	Cycle of profile disciplines	0	27	39	66
Total for theoretical training:		51	116	65	232
FA	Final attestation				8
TOTAL:					240

Decision of the Educational and Methodological Council of KazNRTU named after K.Satpayev. Minutes № 3 dated 20.12.2024

Decision of the Academic Council of the Institute. Minutes № 4 dated 12.12.2024

Signed:

Governing Board member - Vice-Rector for Academic Affairs

Uskenbayeva R. K.

Approved:

Vice Provost on academic development

Kalpeyeva Z. B.

Head of Department - Department of Educational Program
Management and Academic-Methodological Work

Zhumagaliyeva A. S.

Director - Mining and Metallurgical Institute named after
O.A. Baikunurov

Rysbekov K. .

Department Chair - Metallurgy and mineral processing

Barmenshinova M. .

Representative of the Academic Committee from Employers

Ospanov Y. A.

____Acknowledged____

